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## ЖАНГОВОР ЧОРЛОВ ВОСИТАЛАРИ ТУШУНЧАСИ ВА УНИНГ ИЛМИЙ-НАЗАРИЙ ТАҲЛИЛИ

**Маъруф Гафурович Бокиев**

Ўзбекистон Республикаси Жамоат хавфсизлиги университети батальон  
командири ўринбосари

### АННОТАЦИЯ

Ҳарбий соҳада кўплаб тадқиқотлар олиб борилган бўлсада, бироқ ҳозирга қадар жанговор чорлов воситалари тушунчасининг мазмун-моҳияти комплекс равишда тўла тадқиқ этилмаган. Мазкур мақолада ушбу йўналишда амалга оширилган илмий изланишларнинг натижалари баён этилади.

**Калит сўзлар:** жанговор чорлов, ҳарбий чақирув, вербал жанговор чорлов воситалари, акустик жанговор чорлов воситалари, визуал жанговор чорлов воситалари, ҳарбий чолғу асбоблари, “урана” жанри, юқори десибелли акустик қурилмалар.

### ABSTRACT

Although a lot of research has been done in the military field, the concept of combat vehicles has not yet been comprehensively explored. This article describes the results of scientific research conducted in this direction.

**Keywords:** call to battle, military calls, verbal battle calls, acoustic battle calls, visual battle calls, military instruments, uranium genre, high decibel acoustic devices.

### КИРИШ

Жанговор вазиятларда қўлланиладиган ҳарбий усул ва воситалар тадқиқотчилар томонидан кўп бор тадқиқ этилган. Лекин, мазкур мақолада илмий муаммо сифатида кўтарилаётган - жанговор чорлов воситалари масаласи ҳалигача тўлиқ ўрганилмаган тадқиқот объекти ҳисобланади. Бу масалани илмий изланишлар кун тартибига олиб чиқиш жанговор ҳаракатларнинг якуни кўп жиҳатдан ҳарбий хизматчиларнинг ахлоқий-руҳий тайёргарлигига боғлиқ бўлиб қолаётган бугунги давр учун жуда долзарб аҳамиятга эгадир.

Ҳозирда хориж ва мамлакатимиздаги илмий адабиётларда жанговор чорлов тушунчасининг комплекс таҳлилига оид маълумотлар кам учрайди. Мавжудлари ҳам мазкур масалага дахлдор яхлид фундаментал илмий изланишлар асосида қўлга киритилган хулосалар эмас.

Дарҳақиқат, Марказий Осиё халқлари кўплаб ҳарбий маршлар, миллий ватанпарварлик қўшиқларига эга бўлган,

бирок афсуски бу йўналишда тадқиқотлар ҳали кам (деярли йўқ) бўлиб, тарихий маълумотларнинг катта қисми очиқланишини кутиб турибди[16].

Маълумки, жанговор чорлов тушунчаси ҳарбий чақирув тушунчасидан фарқ қилади. Жумладан, ҳарбий чақирув бу – “ҳарбий хизматга чақирув, қонун билан белгиланган, фуқароларни қуролли кучлар сафида ҳарбий мажбуриятларни ўташ учун жалб қилиш” [15] ни назарда тутди. Ҳарбий чақирув маъмурий-ҳуқуқий мазмунга эга бўлса, жанговор чорлов эса, эътиқод ва маслакка доир ахлоқий-руҳий ва эмоционал мазмун-моҳият касб этади.

Таъкидлаш керакки, жанговор чорловлар тарихан барча даврлар ва халқларда турлича шакл ва мазмунда ривожланиб келган. Жумладан, жанговор чорловларнинг шакли ва мазмунини шаклланишига ўша халқнинг миллий ҳис-туйғулари, эътиқоди ҳамда ижтимоий-сиёсий жиҳатдан тараққиёт даражаси каби омиллар таъсир этган.

Мазкур мақолада юқоридаги омилларни ҳисобга олган ҳолда жанговор чорлов воситалари бўйича илмий изланиш олиб борган мамлакатимиз, МДХ ва хориж олимларининг қарашларини таҳлил этамиз.

## МАВЗУГА ОИД АДАБИЁТЛАР ТАҲЛИЛИ

Аждодларимизнинг ҳарбий фаолиятини ўрганилишида тарихчи олим Ф.Ҳасановнинг салмоқли ҳиссаси бор. Тадқиқочи мазкур масаладаги илмий изланишларни катта кўламда, яъни, Турон халқлари ҳарбий санъати йўналишида олиб бориб, туркий халқларнинг ҳарбий соҳасига қўшган ҳиссаларини тадқиқ этган. Муаллиф Туронзамин халқларининг милоддан аввалги 1-минг йилликдан милодий XV асргача, яъни, Амир Темур давригача бўлган вақт оралиғида ҳарбий санъат соҳасида эришган ютуқлари, олиб борган жанглари тафсилоти, қурол-яроғлари, қўшин тузилиши, сиёсий-ҳарбий тизими батафсил таҳлил этган ва қимматли маълумотларни қўлга киритган. Лекин, шунга қарамай тадқиқотчи томонидан жанговор чорлов воситалари алоҳида тадқиқот объекти сифатида ўрганилмаган[21].

Мамлакатимиз олимларидан тарих фанлари доктори, профессор А.Замонов[8] Бухоро хонлигида қўшин тузилиши ва ҳарбий бошқарув масаласига доир илмий изланишларида айнан Бухоро хонлигида жанговор чорлов (асосан ҳарбий чолғу) воситаларини таҳлил қилган. Тадқиқотчининг илмий изланишларида гарчи жанговор чорлов тушунчасига умумий таъриф, унинг турлари ва ҳар бир турнинг мазмуни бўйича таҳлил келтирилмаган бўлсада, бирок тадқиқотчи томонидан Бухоро хонлигининг ҳарбий чолғу воситалари, жанг олди ва жанг вақти ҳамда ғалаба жараёнида ҳарбий мусиқачиларнинг фаолияти орқали

жанговор чорловни амалга ошириш жараёни (масалан, Ҳофиз Таниш ал-Бухорийнинг “Абдуллонома” асари каби) бирламчи манбалар орқали очиб берилган.

А.Замоновнинг таъкидлашича, Бухоро хонлигининг ҳарбий фаолиятида жанговор чорлов (ҳарбий чолғу) воситалари фаол қўлланилган. Жумладан, “жангнинг бошланиши, бирор ҳарбий қисмнинг жангга кириши ёхуд қўшиннинг жангдан чақириб олиниши каби вазифалар ноғорачи, карнайчи ва сурнайчилар ижросида амалга оширилган” [8].

Мазкур масалага яқин йўналишда тадқиқотчи Б.Турсунов ҳам илмий тадқиқот олиб борган [17]. У ўз тадқиқотида “Қўқон хонлигида ҳарбий иш ва қўшин: ҳолати, бошқаруви, анъаналари (XIX асрнинг 70-йилларигача)”ни ўрганган.

Юқорида тилга олинган олим А.Замонов Бухоро хонлигининг қўшин тузилиши ва ҳарбий бошқарувни таҳлил этган бўлса, Б.Турсунов Қўқон хонлигининг худди шундай жиҳатларини ўрганган. Таъкидлаш керакки, ҳарбий иш ва қўшин ҳолатига жанговор чорлов воситаларининг таъсири катта экани маълум бўлсада Б.Турсунов томонидан мазкур масала батафсил ўрганилмаган. Унинг изланишларида асосан Қўқон хонлиги қўшинлари томонидан жангга кириш вақтида қўлланилган такбир – “Аллоҳу Акбар” жанговор ҳайқириғи ҳамда жанг аввалида чалинадиган акустик воситалар – ҳарбий чолғу асбобларига қисман тўхталиб ўтилган.

Тадқиқотчи Б.Турсуновнинг илмий изланишларида ҳам жанговор чорлов воситалари тушунчасига илмий таъриф берилмаган.

Яна бир тадқиқотчи Ю.А.Шукураллаев ўз тадқиқотида Бухоро амирлигининг ҳарбий фаолиятини тадқиқ қилган [19]. Тадқиқотчининг илмий изланишлари юқоридаги олимлардан фарқли ўлароқ Бухоро амирлигидаги қўшин ва ҳарбий иш таҳлиliga бағишланган. Мазкур тадқиқот ишида ҳам жанговор чорлов (унда ҳам асосан ҳарбий чолғу) воситалари қисман таҳлил қилиб ўтилган. Жумладан, Бухоро амирлиги даврида аввалги даврлардан фарқли ўлароқ жанговор чорлов (тадқиқот ишида келтирилишича, ҳарбий чолғу) воситаларининг “овози” нисбатан пастлаган. Тадқиқотчи бундай вазият сабабларини ўша даврда амирликда юзага келган ижтимоий-сиёсий, иқтисодий ва ҳарбий турғунлик билан боғлаган.

Тадқиқот ишида гарчи жанговор чорлов тушунчасига батафсил тўхталмаган ва илмий таъриф берилмаган бўлсада, бироқ яна бир ўзига хос воқеилик илмий жиҳатдан асослаб берилган. Бу воқеилик миллий ҳарбий тарихимизда жанговор чорлов воситаларининг Ғарб таъсирида ўзгариши билан боғлиқ



бўлиб, бу жараён айнан XIX аср охирида Бухоро амирлигида юз берган. Жумладан, биринчи бўлиб Ғарб стандартидаги акустик жанговор чорлов воситалари, яъни ҳарбий оркестр айнан Бухоро амирлиги қўшинида ўз фаолиятини бошлаган.

Мазкур тадқиқот ишининг мазмуни орқали, жанговор чорлов воситаларининг фаол ёки нофаоллиги, миллий руҳда бўлиши ёки бўлмаслиги мамлакатнинг ижтимоий-сиёсий, иқтисодий ва ҳарбий салоҳиятига бевосита боғлиқ бўлиб, ушбу соҳаларда муаммо юзага келган тақдирда жанговор чорлов воситалари миллий ҳис-туғусидан бутунлай узоқ бўлган бошқа шакл ва мазмундаги воситалар билан ўрин алмашишини англаш мумкин.

Тадқиқотчи З.С.Сафарова ўз тадқиқотида иккинчи жаҳон уруши даврида Ўзбекистон мусиқа санъатига янги анъаналар (симфония, опера, мушқали драма ва б.) нинг кириб келишига оид трансформацион ҳолатларни очиб берган[14].

Мазкур тадқиқот иши хулосаларидан иккинчи жаҳон уруши нафақат халқимизнинг ижтимоий-маданий ҳаётини айна вақтда мусиқа санъати жумладан, жанговор чорлов воситаларининг бир тури ҳисобланган – ҳарбий чолғу воситаларини ўзгаришига ҳам катта таъсир этган бўлиб, мазкур ўзгаришлар XIX аср охирида бошланган бўлсада, унинг тугал якуни иккинчи жаҳон уруши йилларига тўғри келганини англаш мумкин.

Мана шундай мазмундаги тадқиқот ишларини С.Р.Самаров, Ҳ.Дадабоев, Ҳ.Ёдгоров, Ў.Мавлонов, Н.Нурдинова ва М.Собиров каби олимларнинг илмий изланишларида ҳам кўриш мумкин.

Юқоридаги таҳлиллардан маълум бўладики, мамлакатимиз олимларининг илмий изланишларида жанговор чорлов воситаларининг асосан бир тури – ҳарбий чолғу воситалари ўрганилган. Шунинг учун ҳам бугунги кунгача мазкур соҳадаги тадқиқот ишарида жанговор чорловнинг вербал, акустик, визуал ҳамда аралаш воситалари масаласида комплекс илмий тадқиқотлар учрамайди. Мавжудлари эса, юқорида таъкидланганидек, жанговор чорловнинг маълум бир турига бағишланиб, мазкур масалани комплекс ҳолатда англашимизга имкон бермайди.

## ТАДҚИҚОТ МЕТОДОЛОГИЯСИ

Мустақил давлатлар ҳамдўстлиги ҳудудидаги олимларнинг илмий тадқиқотларида ҳам жанговор чорлов воситаларининг у ёки бу жиҳатлари ўрганилган. Жумладан, рус олими М.Г.Рабинович жанговор чорлов воситалари масаласига комплекс ёндашмаган бўлсада, бироқ унинг бир тури ҳисобланган жанговар ҳайқириклар

бўйича чуқур илмий изланиш олиб борган. Тадқиқотчи ўзининг илмий изланишлари натижасида жанговор ҳайқирикни уч гуруҳ[12]га: биринчиси, тотем ёки диний-маданий ҳамда қабилавий, иккинчиси, муқаддас жой (тепалик ёки тоғ), учинчиси, аجدодлар, яъни вафот этган номдор аجدодлар (руҳи)га ёки ҳозирда тирик шахс (масалан, раҳбар)га таалуқли турларга ажратган.

М.Г.Рабинович жанговор ҳайқириққа оид классификацияси ўзига хос ёндашув бўлиб, илмий изланиш натижасида қўлга киритилган хулосалар асосида унинг турлари бўйича келтирилган ёндашувга қўшилиш мумкин.

МДХда амалга оширилган тадқиқотларда ҳарбий соҳанинг муайян аниқ ҳудуд ва даврга оид илмий изланишлари кўп учрайди. Жумладан, тарих фанлари доктори Л.А.Бобров ўз изланишларида Марказий, Ўрта ва Шарқий Осиё халқларининг муқоффа қуролиларини ривожланиш эволюциясини тадқиқ этган[1, 2]. Тадқиқотчи томонидан Марказий, Ўрта ва Шарқий Осиё халқларининг ҳарбий қуролиларини тадқиқ этилиши баробарида, мазкур халқлар томонидан ҳарбий ҳаракатларда қўлланилган жанговор чорлов (вербал, акустик ва визуал) воситаларни икки турга, яъни жанговор ва муқоффа воситаларига бўлган. Л.А.Бобров томонидан жанговор чорлов воситаларини икки турга ажратилиши ўзига хос ёндашув бўлсада, бироқ унинг илмий изланишларида ҳам мазкур воситаларига берилган илмий таъриф етишмайди.

Тожики олими С.С.Хосейниширазининг ҳарбий соҳага доир илмий изланишлари диққатга сазавор бўлиб, унда XVI асрда Мовварауннаҳр ҳамда Эрон ўртасидаги ҳарбий-сиёсий муносабатлар[20] таҳлил этилади. Тадқиқот ишида жанговор ҳаракатларда жанговор чорлов ва ҳақириқлардан ҳам кўра, ҳарбий дипломатия муҳим экани, жанговор чорловнинг асоси эмоция-ирроционаллик, ҳарбий дипломатиянинг асоси роционаллик эканлиги таъкидланади. С.С.Хосейнишираз ҳар қандай ҳарбий ҳаракатлар роционалликка асослансагина якуний натижа ғалаба билан тугалланиши бўйича илмий хулосалар беради.

Таъкидлаш керакки, МДХ олимлари томонидан ҳам жанговор чорлов воситаларининг айрим жиҳатлари ўрганилган бўлиб, бу жараён фалсафа, тарих, филология, сиёсатшунослик, психология каби фанлар нуқтаи назаридан амалга оширилган. Жумладан, рус олимаси филология фанлари доктори Т.Г.Басангова жанговор чорловларни маросим шеъриятининг қадимий жанрларидан бири “урана” жанри сифатида таҳлил қилган[3, 4]. Тадқиқотчи ўз изланишларида жанговор чорлов масаласига ҳарбий мазмундан кўра шеъриятнинг алоҳида бир жанри сифатида қарган ҳамда ўз қарашларини туркий халқлар, жумладан қалмиқ халқининг маросимлари орқали асослашга ҳаракат қилган.

А.А.Волоковых тарих фанлари номзодлиги бўйича олиб борган тадқиқот ишида хронологик доираси 1941-йил 22-июндан 1944-йил сентябргача бўлган даврда олиб борилган партизанлик урушида қўлланилган жанговор чорловларни қисман таҳлил этган[5]. Тадқиқотчи ўз тадқиқот ишида партизанларнинг жанговор чорловлари очик фронтдаги жанговор чорловлардан қисман фарқ қилиши, жумладан, бунга стихияли шаклланадиган (миллий ва диний мансублиги ҳамда ҳарбий кўникмаси турлича бўлган) субъектлар, жанговор ҳаракатларда “пистирма” усулининг устиворлиги каби омиллар таъсир этишини илмий жиҳатдан асослаб берган.

М.В.Медведев томонидан шахсий ҳамда архив материаллари асосида яратилган «Боевой клич» в тылу врага» асарида бевосита жанговор ҳаракатларда фаол иштирок этган «Боевой клич» партизан отрядининг фаолияти таҳлил этилган. Тадқиқотчи томонидан мазкур партизан отрядининг 1941 йилдан 1944 йилгача душмanning орқа томонидан зарба беришдаги 32 та жанговор партизанлик фаолияти ҳамда манашу натижаларга ундаган рухий-жанговор омиллар ўрганилган[10].

А.А.Волоковых ҳам М.В.Медведев ҳам ўз изланишларида жанговор чорлов, жанговор чақирик ҳамда жанговор ҳайқирик тушунчаларини қўллаган бўлсада, бироқ, улар томонидан мазкур тушунчаларга илмий таъриф берилмаган.

Рус олими Л.М.Рязановский ўзининг илмий изланишларида нацистлар Германиясида мавжуд бўлган ижтимоий ҳамда жанговор шиор ва чақирикларни таҳлил этган. Тадқиқотчи нацистларнинг жанговор ва ижтимоий чақириклари *биринчи навбатда*, христиан динига таалукли иборалар ёки тўғридан-тўғри Инжилдан олганлиги, *иккинчидан*, ишчиларни ижтимоий ва ҳарбий фаолиятга жалб қилиш учун социализм ва ишчи ҳаракати шиорларидан фойдалангани (нацистлар ҳокимиятга келгач бу мазмундаги шиор ва чақириклардан воз кечилгани), *учинчидан* эса, мазкур чақириклар учун энг асосий манба Гитлернинг китоб ва нутқлари бўлганини таъкидлайди. Мазкур уч асосдан олинган шиор ва чақириклар ўз навбатида ўша даврининг тарғибот воситалари: афишалар, оммавий ахборот воситалари, мактаб таълими ҳамда куй-қўшиқлар орқали тарғиб этилган[13].

Л.М.Рязановский гарчи жанговор чақириклар масаласига чуқур кириб бориб, нацистлар Германиясининг ижтимоий ва жанговор чақирикларининг манбалари ҳамда тарғиб этиш воситаларигача таҳлил этган бўлсада, бироқ у ҳам юқоридаги тадқиқотчилар қатори жанговор чорловнинг бошқа турлари масаласига тўхталмаган.



Жанговор чорлов масаласи МДХ олимлари тадқиқотларида ҳам худди мамлакатимиз олимлари тадқиқотлари каби яхлид тадқиқот объекти сифатида ўрганилмаган, аксинча, унинг алоҳида қисмлари муайян тарихий давр ва вазиятга боғланган ҳолда таҳлил этилган.

## ТАҲЛИЛ ВА НАТИЖАЛАР

Мавзу бўйича хорижда олиб борилган илмий изланишлар ўрганилганда аввало АҚШлик тадқиқотчи Джеймс Макферсоннинг илмий изланишлари таҳлиliga тўхталиш лозим. Тадқиқотчи айнан 1861 йилдан 1865 йилгача АҚШда жанубий ва шимолий штатлар ўртасида бўлиб ўтган фуқоролар урушини тарихий ҳужжатлар асосида ўрганган[11]. Мазкур изланишларида муаллиф томонидан бир халқ ўртасида бўлаётган урушда, яъни фуқаролик урушида қўлланилган жанговор чорловлар ҳам таҳлил этилган бўлиб, уларнинг турли хилда эканлиги, бунинг асосий сабаби американинг кўп миллатли маданияти, жануб ҳудудида асосан испан, шимолда эса англо-сакс маданиятининг устуворлик касб этганлигига эътибор қаратган.

Тадқиқотчининг мазкур хулосаларига асосан жанговор чорловлар бевосита миллатнинг келиб чиқиши ва маданиятининг ҳосиласи эканлигини англаш мумкин.

Яна бир АҚШлик тадқиқотчи А.Дарвин ҳам 1861-1865 йиллардаги Америка фуқаролар урушида қўлланилган жанговор чақириқларни тадқиқ этади. Унинг изланишларига кўра мазкур урушда икки хил жанговор чақириқлар қўлланилган. Жумладан, АҚШда фуқаролар уруши бошланганида мамлакатнинг диний раҳбарлари Конфедерация ва Иттифоқ кучлари учун энг яхши ғоявий ҳимоячи ва урушга қўшин ёллашдаги асосий тарғиботчи куч бўлган. Тадқиқотчининг нуқтаи назарига кўра, мазкур расмий диний раҳбарларнинг чақириқлари урушга оид жанговор чақириқ бўлса, ўша даврда ибтидоий насронийликка асосланувчи, эркин ташкил этилган “Масиҳнинг шогирдлари” диний ҳаракатининг урушга қарши чақириғи иккинчи жанговор чакриқ эди[18].

А.Дарвиннинг тадқиқоти орқали жанговор чорлов воситалари тарихида “тинчликка оид жанговор чақириқ”лар ҳам мавжуд бўлганини англаш мумкин.

Француз тадқиқотчиси Денис Беатрис[6] ўз изланишларида рассом ва Наполеон армиясининг ҳарбий хизматчиси Луи-Француа Лежеун (1775-1848)нинг жанговар расмларини тадқиқ этади. Илмий изланишлари давомида тадқиқотчи томонидан ўзига хос, яъни “жанговор расмлар ҳам жанговор чорловнинг бир тури” эканига оид илмий хулосалар берилади.

Дарҳақиқат, жанговор чорлов воситалари вербал, акустик ва визуал бўлиши мумкинлигини инобатга оладиган бўлсак, мазкур ўринда Денис Беатрисни фикрига қўшилиш мумкин.

Мазкур масалада хориж олимларидан Зайнаб Алсадат ҳам салмоқли изланишлар олиб борган. Жумладан, у XIX аср охири ва XX аср бошларида Усмонлилар, Қажарлар (Эронда) ва Британия империялари ўртасидаги зиддият ва ҳарбий ҳаракатларни таҳлил қилган. Мазкур тадқиқот ишида гарчи жанговор чорлов воситалари алоҳида объект сифатида ўтганилмаган бўлсада, бироқ унда ўз даврида уч империя томонидан вербал, акустик ва визуал шаклларда қўлланилган жанговор чорлов воситаларини билиб олиш мумкин[9].

Француз тадқиқотчиси Жулиетте Волклер тарихий жанговор чорлов воситаларидан бири бўлган акустик қурилмаларнинг ҳозирги кундаги ривожланиш даражасини тадқиқ қилган. Тадқиқотчининг таъкидлашича, бугунги кунгача дунёнинг кўплаб йирик давлатлари, жумладан, АҚШ, Германия ва собиқ Совет Иттифоқи акустик қурулларни ишлаб чиқишга интилишган. Аралаш натижаларга қарамай, бундай иш кўплаб технологияларнинг ривожланишига олиб келган. Масалан, ҳозирда кўплаб давлатлар ҳарбий тизимида Узоқ масофали акустик қурилма (Long-Range Acoustic Device - LRAD)ни мавжудлиги, 2009 йилда Питсбург полицияси томонидан G20 намоёнчиларига қарши овозли тўпни қўлланилгани, Афғонистон ва Ироқда бўлган жангларда АҚШ ҳарбийлари томонидан ҳарбий автомобилларга мустаҳкамланган катта динамиклар ёрдамида рақибларига нисбатан психологик операция ҳамда асирларни сўроқ қилиш жараёнида “яхшиланган сўроқ” усули сифатида AC/DC, Эминем ва Металлика кўшиқларини “портлатишган”ни маълум.

Жулиетте Волклернинг таъкидлашича[7], бугунги кунга келиб, акустик воситалар жанговор чорлов воситалари доирасидан чиқиб, юқори десибелли, “ўлдирмайдиган” товушли қурул даражасига етган ҳолда Ғазо секторидан Уолл-стритгача бўлган йирик сиёсий ва ҳарбий ҳаракатларда душманни йўқ қилувчи ҳамда Гуантанамо ва бошқа жойларда оламонни қийноққа солувчи воситага айланган.

## ХУЛОСА ВА ТАКЛИФЛАР

Хулоса қиладиган бўлсак, хориж ва мамлакатимизда амалга оширилган тадқиқот ишларининг таҳлили куни кўрсатадики, уларнинг барчасида ягона ўхшашлик мавжуд. У ҳам бўлса, ушбу тадқиқот ишларда жанговор чорлов воситаларига комплекс ёндашув ҳамда



мазкур тушунчага илмий таъриф бериш вазифалари амалга оширилмаган.

Дарҳақиқат, бугунги кунда жанговор чакириқ ёки жанговор ҳайкирик тушунчалари бўйича илмий таърифлар мавжуд. Бироқ, ҳозиргача илмий истемолда вербал, акустик ва визуал шаклларда жангга чорлов воситаларини умумий маъносини англатувчи илмий таъриф мавжуд эмас.

Илмий истемолдаги мазкур бўшлиқни тўлдириш мақсадида, мазкур мақоланинг якуний натижаси сифатида жанговор чорлов тушунчасига муаллифлик таърифи беришни лозим топдик. Демак, бизнингча, *жанговор чорлов воситалари* – бу жанговор вазиятларда ҳарбий хизматчиларнинг миллий, диний ва бошқа туйғуларни уйғотиш, ишонч ва иродасини мустаҳкамлаш, душманга нисбатан нафрат ва таҳдидини намоёиш қилиш ҳамда ўзаро ахборот алмашишини таъминлашга қаратилган вербал, акустик ва визуал воситалар мажмуаси ҳисобланади.

Муаллифлик таърифимиз умумий характерга эга бўлиб, унга кўра жанговор чорлов воситалари инсонни жанг учун руҳий-эмоционал қўзғалишга мажбур қиладиган барча (вербал, акустик ва визуал) шакл ва мазмундаги воситаларни ўз ичига олади.

Мазкур мақола хулосалари асосида, жанговор чорлов воситалари масаласи мамлакатимиз, МДХ ва хориж олимлари тадқиқотларида умумий тадқиқотнинг кичик бир қисми сифатида қаралиб келинганини англаш мумкин. Бизнинг тадқиқотимизда эса мазкур масалага комплекс ёндашиш ғояси илгари сурилмоқда.

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## ONA TILI TA'LIMIDA O'QUV LUG'ATLARING YARATILISHIGA BO'LGAN TALAB

**Durdona Gurbanmurat qizi Allaberdiyeva**

[durdonallaberdiyeva39@gmail.com](mailto:durdonallaberdiyeva39@gmail.com)

### ANNOTATSIYA

Ushbu maqolada milliy tilimizni rivojlantirish yo'lida amalga oshirilayotgan ishlar, bu yo'lda o'quv lug'atlarining ahamiyati qanday darajada ekani, o'quvchilar uchun o'quv lug'atlari zarurligi haqida so'z boradi.

**Kalit so'zlar:** o'quv lug'ati, ko'nikma, shakllantirish, tadqiqot, sun'iy intellekt, omonim, paronim, frazeologiya, imlo, darslik, ona tili, milliy til.

### KIRISH

Ma'lumki, hozirgi globallashgan davrda dunyoda ko'p tillar o'lik tilga aylanib bormoqda. Butun dunyo xalqlari o'z tillarini o'lik tillar qatorida turishdan asrash uchun har kun yangidan-yangi loyihalar qilishmoqda. Shiddat bilan jadallashayotgan davrda milliy tillari uchun kurashmoqdalar. Bizlar o'z ona tilimiz bo'lmish o'zbek tilini yanada rivojlantirish, nufuzini oshirish uchun bor imkoniyatlarimizni ishlatmoqdamiz. Yurtimizning yuqori ilmiy tajribaga ega olimlari milliy til korpusi, sun'iy intellekt ustida katta ishlar olib borishmoqda. Xususan, Toshkent davlat o'zbek tili va adabiyoti universiteti professori, filologiya fanlari doktori Baxtiyor Mengliyev sun'iy intellekt haqida: "Axborot asrida rivojlanishga da'vogar har qanday til sun'iy intellekt tiliga aylanishi kerak. Ona tilimizning dunyo miqyosidagi nufuzi faqat tashviqot-targ'ibot bilan oshmaydi. Bu muammolarni hal etish borasida olimlar tomonidan ko'plab ilmiy tadqiqot va amaliy ishlar bajarilishi kerak". [Mengliyev.9]

### ADABIYOTLAR TAHLILI VA METODOLOGIYA

Milliy til korpusi yaratish bo'yicha amaliy ishlar yo'lga qo'yilmoqda, til bo'yicha dissertatsiya, magistrlik ishlari va tadqiqotlar qilinmoqda, lekin shuncha urinishlarga qaramasdan ona tili ta'limida o'rganilmagan yo'nalishlar uchramoqda. Ona tili ta'limda hali to'liq o'rganilmagan yo'nalishlar bor. Ona tili ta'limida e'tibor berilishi kerak bo'lgan sohalardan biri o'quv lug'atlarini yaratish muammosidir. Birinchi Prezidentimiz tomonidan bu borada quyidagicha fikr yuritilgan: "..... fundamental fanlar, zamonaviy kommunikatsiya va axborot texnologiyalari, bank, moliya tizimi kabi o'ta muhim sohalarda ona tilimizning qo'llash doirasini kengaytirish, etimologik va qiyosiy lug'atlar nashr ettirish, zarur atama va iboralar, tushuncha va kategoriyalarni



ishlab chiqish, bir soʻz bilan aytganda oʻzbek tilini ilmiy asosda har tomonlama rivojlantirish, milliy oʻzlikni, Vatan tuygʻusini anglashdek ezgu maqsadlarga xizmat qilishi shubhasiz”. [Karimov.2021.3:176-b]

Bu sohaning bugunga kelib rivojlanmay qolganligi, bugungi jadallashayotgan davrda yoshlarning bu sohadagi bilimlari sayoz ekanligi, oʻquv lugʻatlariga boʻlgan ehtiyojni oshirmoqda. Lugʻatlar – bu millatning lingvistik kompetensiyasi, xalqning donishmandligi xazinasi, har qanday mamlakatning ijtimoiy-siyosiy, madaniy-maʼrifiy, iqtisodiy rivojlanishning ramzidir. Lugʻat faqat tilni oʻrganishga emas, balki xalqning madaniyati, turmush tarzi va boshqa jihati xususida ham maʼlumot berish uchun xizmat qiladi. Professor Baxtiyor Mengliyev tomonidan lugʻat oʻquvchini oʻz ustida ishlashga oʻrgatishi, uning doimiy hamrohi boʻlishi, barcha savollarga javob bera oladigan beminnat yordamchi boʻla olishi aytilgan. [Berdiyeva.2021.1:264-b] Oʻquv lugʻatlari oʻquvchining yonida boʻlib u tushunmagan soʻz va topshiriqlarni bajarishda katta yordamchi boʻladi. Oʻquvchilarga darslikdagi soʻzlarni maʼno mantigʻini toʻliq anglash, qanday maʼnolarda qoʻllash, qanday vaziyatlarda ishlatish toʻgʻrisida katta maʼlumot beradi. Oʻquvchilarga beminnat yordamchi boʻladigan bunday lugʻatlarni shakllantirish davr zarurati boʻlib qolmoqda.

Maʼlumot olish, til oʻrganishga yordam berish maqsadida yaratilgan har qanday janr va hajmdagi leksikografik asarga oʻquv lugʻati deyiladi. [Morkovin.1990:72] Oʻquv lugʻatlari hajman kichik, maʼlum bir tartibda soha koʻlami chegaralangan holda boʻladi. Oʻquv lugʻatlari termini rus leksikografiyasida ilk marotaba Polivanovning “Qisqacha ruscha-oʻzbekcha lugʻati”da yozgan kirish soʻzida qoʻllaniladi. Muallif lugʻatni tavsiflar ekan “..lugʻat hajmiga koʻra oʻquv lugʻati tipiga mansub....” deb taʼkidlaydi. Oʻquv lugʻatlarni ilmiy asosda oʻrganish XVII asr boshlarida birinchi ingliz leksikografi S.Jonson, XIX asr boshlarida fransuz tilshunoslari J.Dyubua, K.Dyubua, G. Matore, K.Bak, ispan tilshunosligida Y.Malkil ishlaridan boshlandi. Keyinchalik rus tilshunosligida ham leksikografiyaning bu tarmogʻini takomillashtirish davlat ahamiyatidagi masala sifatida kun tartibiga qoʻyildi. 1966-yilda Moskva davlati universiteti rus tili ilmiy-uslubiy markazi Oʻquv lugʻatchiligi sektori tashkil etildi. 1969-yilda rus tili va adabiyoti oʻqituvchilarining Birinchi xalqaro anjumani oʻtkazilib, unda yaratilgan oʻquv lugʻatlarini moliyalashtirish, nashr ishlari amalga oshirish masalasi koʻrib chiqildi. Pushkin nomidagi rus tili instituti “Oʻquv lugʻatchiligi” sektori vakillari Leningrad, Samarqand, Minsk, Toshkent, Odessa, Kembrij (AQSH), Amerst (AQSH) shaharlarida simpozium va anʼanaviy anjumanlar oʻtkazilib, qator muammolar hal qilindi; mavzuga doir 50 dan ortiq ilmiy tadqiqotlar amalga oshirildi.[8] Rus maktablari uchun oʻquv lugʻatlari yaratishda rus tilshunoslari: P.N.Denison, L.A.Novikov, S. G.Barxudarov,





V.V.Morkovkin va boshqalar sezilarli darajada katta natija ko'rsatishdi.

## MUHOKAMA VA NATIJALAR

Yevropa va boshqa davlatlarda o'quv lug'atchiligi borasida katta ishlar qilinayotgan bir paytda biz rus mustamlakasida edik. Afsus, bilan aytish kerakki, o'sha paytda bu mavzuga jiddiy e'tibor berilmadi. Bizning yurtimizdagi rus maktablari uchun o'quv lug'atlari ishlab chiqilgan va nashr etilib ommalashtirilayotgan paytda o'zbek maktablari uchun ham o'quv lug'atlar ishlab chiqilgan, lekin tashabbus kuchaymagan. Vaholanki, umum ittifoq miqyosida o'tkazilgan milliy maktablarda o'qitiladigan rus tili darslari va o'quv lug'atiga bag'ishlangan anjumaning ikkitasi Samarqand va Toshkentda bo'lgan. Anjuman tashkil etilganida, tilshunoslar jonbozlik ko'rsatib, faol ishtirok etilmaganligi, tashabbus bilan chiqilmaganligi bois o'sha davrda bizning o'zbek maktablari uchun o'quv lug'atlari ishlab chiqilmadi va bu muammo haligacha davom etmoqda.

Mustaqillikka erishganimizdan so'ng milliy tilni rivojlantirish uchun ko'plab ishlar amalga oshirildi. Xususan, lug'atchilik sohasida katta siljishlar, o'zgarishlar bo'ldi. Siyosiy, ma'naviy, ijtimoiy jihatdan eskirgan lug'atlar qayta nashr etildi. Ona tili ta'limini isloh qilish harakatlari samarasi o'laroq, ta'lim mazmuni, maqsadi yangilandi : ona tili ta'limi oldidagi asosiy vazifa ijodiy tafakkur sohiblarini yetishtirib chiqarish deb belgilandi. Shundan kelib chiqqan holda umumiy o'rta ta'limning davlat ta'lim standartida (DTS) ona tili o'qitishning asosiy vositalariga darslik bilan birga lug'atlar ham kiritildi.[1999: 59] DTSda o'quvchilarning darslik bilan ishlash davomida lug'atlar bilan ishlash ko'nikmasini shakllantirish, fikrni ifodalayotganda so'zlarni ma'nosiga qarab to'g'ri jumla tuza olishi ham inobatga olingan. Xususan, olimlarimiz tomonidan ishlab chiqilgan o'quv lug'atlar: Mengliyev B.M. Bahridinova B.M. "O'zbek tilining so'z tarkibi o'quv lug'ati" 2007–2009.; O.Shukurov, B.Boymatova "O'zbek tilining ma'nodosh so'zlar o'quv lug'ati" 2007–2009.; Mengliyev B.M. Bahridinova B.M., Xoliyorov O'. "O'zbek tilining so'z yasalihi o'quv lug'ati" 2008.; To'rayeva U., Shodmonova D. "O'zbek tilining zid ma'noli so'zlar o'quv lug'ati" 2007–2009.; Islomov I. Bobojonov Sh. "O'zbek tilining so'zlar darajalanishi o'quv lug'ati" 2007–2009.; Xamrayeva Y. "O'zbek tilining o'zlashma so'zlar o'quv lug'ati" 2007–2009.; Mengliyev B. Xudoyberdiyeva M. "O'zbek tili iboralari o'quv lug'ati" 2007–2009.; Nafasov T. Nafasova V. "O'zbek tilining o'quv toponimik lug'ati" 2007.; X.Suvonova G.Turdiyeva "O'zbek tilining shakldosh so'zlar o'quv lug'ati" 2007–2009.; X.Norxo'jayeva "O'zbek tilining eskirgan so'zlar o'quv lug'ati"



2006.; Nafasov T. Nafasova V. “O‘zbek tilining talaffuzdosh so‘zlar o‘quv lug‘ati” 2008.[Tursonov, 2021: 388]

Bu lug‘atlar olimlarimiz tomonidan qilingan ishlarning boshlang‘ichi bo‘lib, ammo lug‘atlar to‘liq, mukammal shaklda ishlab chiqilmagan. Ishlab chiqilishi kerak bo‘lgan o‘quv lug‘atlar qatoriga “O‘zbek tilining o‘quv izohli lug‘ati”, “O‘zbek tilining imlo o‘quv lug‘ati” ni ham kiritishimiz kerak. Tuzilgan lug‘atlar maktab o‘quvchilariga yetib bormagan, maktablar lug‘atlar bilan ishlashga tayyor emas, maktab kutubxonalari o‘quv lug‘atlari bilan ta‘minlanmagan. Professor Baxtiyor Mengliyev o‘rinli ta‘kidlaganidek: “O‘quv lug‘ati zaruriyati haqida ko‘p gapirib yozib kelinmoqda. O‘quv lug‘ati yaratilmas, o‘quvchining stolida ona tilidan uning yoshiga mos ko‘plab o‘quv lug‘atlari turmas, buning uchun o‘quv leksikografiyasi nazariy va amaliy soha sifatida tizimli yo‘lga qo‘yilmas ekan, ona tili ta‘limi o‘zing haqiqiy mohiyatidan begonaligicha qolaveradi”. [Karimova: 268] Darhaqiqat, o‘quv lug‘atlari yaratilishi haqida ko‘p gapirilyapti, lekin amaliyotda hech bir ish qilinmayapti, bu yo‘nalish bo‘yicha tadqiqotlar qilinishi kerak. Lug‘atlarni qayta ishlab chiqib o‘quvchilarga yetkazish, ularda bu kitoblarga bo‘lgan ehtiyojlarni bartaraf qilishimiz kerak. Maktab o‘quvchilarida lug‘atlar bilan ishlash ko‘nikmasini shakllantirish lozim, chunki ularda ko‘nikma ham bilim ham yetarlicha emas, bu lug‘atlar bilan ishlar o‘quvchilarda bu ko‘nikmalarni nafaqat shakllantiradi, bilimlarini rivojlantirishga ham yordam beradi. Yevropa davlatlari o‘quv lug‘atchiligi masalasi bo‘yicha oladigan qo‘ygan maqsadga erishib, lug‘atlarni elektronlashtirish masalalari bilan shug‘ullanmoqdalar. Bizda esa hali bu bosqichlarni bosib o‘tish uchun ancha ishlar qilinishi lozim.

O‘quvchilarning savodxonligi va lug‘atlar bilan ishlash ko‘nikmasini shakllanganligi, eskirgan so‘zlar (arxaizm, tarixiy), yangi (neologizmlar), o‘zlashgan so‘zlar ma’nolarini to‘g‘ri tahlil etgan holda kerakli vaziyatda ishlata olishi, iboralarini qanday mazmun anglatayotganini ongli ravishda tushunib, matn yoki gapdan to‘g‘ri tahlil qila olishlari qay darajada ekanligi, o‘quv lug‘atlariga ehtiyoj qanchalik zarurligini bilish maqsadida kichik tadqiqot olib bordik. Bu tadqiqot bitiruvchi sinf o‘quvchilarida olib borildi, chunki ularda yuqoridagi barcha ko‘nikma va bilimlar shakllangan bo‘lishi kerakligi, oliy o‘quv yurtlariga kirish imtihonlarida to‘g‘ri yozish, so‘zlarni ma’nolarini bilish, iboralar bilan ishlash to‘g‘risidagi savollarga duch kelishadi, shuni inobatga olib, o‘n bir yillik ta‘limda olgan bilimlarini sinab ko‘rish maqsadida tadqiqot bitiruvchi sinflarda o‘tkazildi. Tadqiqotida o‘quvchilarga bir nechta topshiriqlar berildi.

### 1-topshiriq

1.Lahcha ( cho‘g‘), jurat, juziy, muboxasa, mutola, istemol, suiistemol, maxsulot, ganch (xazina), taluqli,



**ta'qirlamoq, taqib etmoq, mudofa, kekaymoq, akilamoq.** Ushbu so'zlarni to'g'rilab yozing.

Ushbu topshiriqda o'quvchilarning yozma savodxonligini qay darajada ekanligini tekshirib olindi. O'quvchilarning aksariyati **laxcha** so'zini qanday yozilishini bilmasliklariga, **ganch** va **ganj** paronimlarini bilmasliklari va topshiriqda shu so'zni yozilishini to'g'ri deb belgilaganlariga, kundalik hayotimizda ham ishlatiladigan **akillamoq, kekkaymoq** so'zlarini ham qanday yozilishini bilmasliklariga guvoh bo'lindi. Bu so'zlarni darslikdan olinganligi va ko'p qo'llanadigan bo'lishiga qaramay, o'quvchilar xato qilishmoqda. Quyida bu topshiriqning qanday darajada to'g'ri bajarilganligi foizi diagrammada berilgan.

## 2. Paronim so'zlarni ma'nosiga qarab to'g'ri joylashtiring.

Burj, burch, azim, azm xiyla, hiyla

1. Quyoshning bir yillik harakati yo'lida joylashgan.....

2. Vatanimiz oldidagi..... kattadir.

3. Behuda qon to'kmoq, yurtni parchalamoqdan..... gunoh yo'q! (Oybek. "Navoiy" romanidan)

4. Anvar Xudoyorxonning oldiga ..... bilan keldi. ("Mehrobdan chayon" romanidan)

5. Bemorning sog'ligi ..... yaxshilandi.

6. Davron bir necha bor dushman iskanjasiga tushgan, biroq dovyuraklik bilan yovga chap berib, ..... ishlatib g'olib chiqqan. (T. Rustamov "Mangu jasorat" asaridan)

Paronimlar bilan bog'liq topshiriqda o'quvchilar ko'proq **azim** va **azm** so'zlarini ma'nosini bilmasliklari tufayli xatolikka yo'l qo'ydilar. O'quvchilarning ba'zilar esa **hiyla** va **xiyla** so'zlarini joylashtirishda ikkalasini o'rnini almashtirib qo'ydilar. Bundan kelib chiqadiki, o'quvchilar paronimlarni qanday ma'no anglatishi va qo'llanish vaziyatini bilishmaydi. Topshiriqni bir nafar o'quvchi barcha so'zlarni to'g'ri joylashtirgan. Quyida bu topshiriqning qanday darajada to'g'ri bajarilganligi foizi diagrammada berilgan.

3. Iboralarni ularning ma'nosiga to'g'ri keluvchi so'z birikmalari yoki so'zlar bilan moslashtiring.

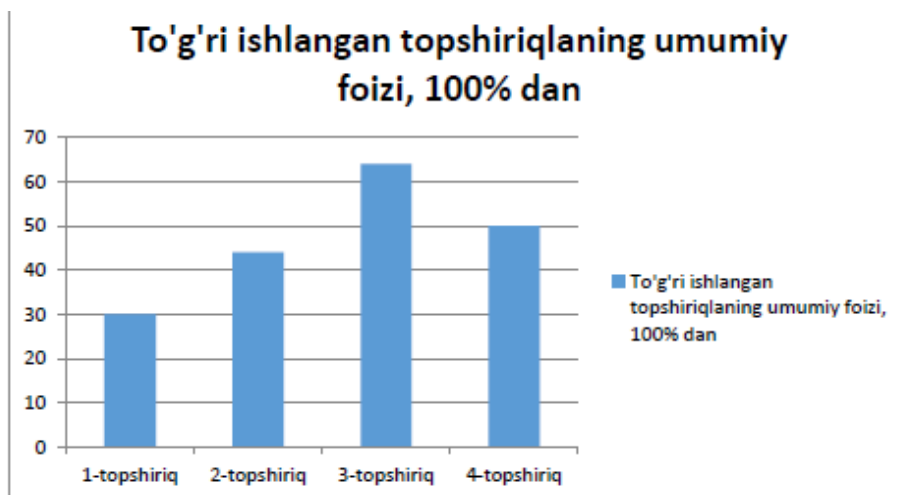
Ma'nosi

Iboralar

1. Sichqonning ini ming tanga
2. Ko'zini bo'yamoq
3. To'nini teskari kiymoq
4. Misi chiqmoq
5. Igna ustida o'tirmoq

- a. jahli chiqmoq
- b. tashvishga tushmoq
- c. siri fosh bo'lmoq
- d. aldamoq
- e. qo'rqmoq





Olib borgan tadqiqot natijasi shuni ko'rsatdiki, o'quv lug'atlari ishlab chiqilib o'quvchilarni qo'liga yetkazilishi kerak. Taklifimiz shuki, o'n besh yil oldingi ishlab chiqilgan o'quv lug'atlarini qayta ko'rib chiqib, yangidan o'quv lug'atlari yaratish ustida ishlashimiz lozim. Bu kabi lug'atlar bilan ishlash o'quvchilarda erkin fikrlash, fikrlarini yozma va og'zaki to'g'ri bayon qila olish, tafakkurini o'stiribgina qolmay, o'quvchilarni ijodiy tafakkurini rivojlantiradi, so'z zaxirasini boyitishga xizmat qiladi. So'zlarni o'z o'rnida, vaziyatida qo'llashni o'rgatadi. Professor Baxtiyor Mengliyev ta'kidlaganidek: "O'quvchilar uchun zaruriy lug'atlar yaratilmas ekan, ijodiy tafakkurni rivojlantirish mumkin emas, og'zaki va yozma nutqni o'stirish vositasi bo'lgan joriy darsliklar o'z vazifasini to'liq bajara olmaydi". [Mengliyev, 2009: 5-b] Amaldagi darsliklardagi berilgan lug'atlar o'quvchilar uchun ozlik qiladi, lekin butun boshlik darslikni lug'atlar bilan to'ldirib bo'lmaydi. Darsliklarga qo'shimcha tarzda o'quv lug'atlarini ham yaratilishi o'quvchilarga katta yordam beradi. O'quvchilar kelajakda oliy tashkilot rahbari, olim, iqtisodchi, yurist va boshqa kasb egalari bo'lganlarida ulardan hujjatlarni to'g'ri yozish, ravon gapira olish, o'z fikrini boshqalarga to'g'ri tushuntira olish so'raladi. Bular esa o'quvchilarda maktabda ona tili darslarida o'rgatilishi kerak, shuning uchun darslarda faqat grammatika bilan ishlash emas, o'quvchilarni erkin fikrlashga, so'z boyliklarini oshirishga, fikrlarini to'g'ri ifoda qila olishga o'rgatish bugunda qo'yiladigan asosiy talablardir.

## XULOSA

Darslikdagi lug'atlar bilan ishlash mashqlaridagi lug'atlarni ko'rib chiqishni tavsiya etamiz. Tadqiqot o'tkazish jarayonida shuni o'rgandikki, darsliklardagi lug'atlarni berilishida yosh darajasi e'tiborga olinmagan. Ba'zi darsliklarda juda sodda so'zlar berilgan, ba'zi darsliklarda esa juda murakkab so'zlar berilgan. Misol uchun 8-sinf darsligida



matn va lugʻatlar bilan ishlash darslarida oʻquvchilarning tushunishiga murakkab boʻlgan soʻzlarni koʻramiz. 8-sinf darsligining 25-26-darslarida berilgan 65- mashqda **miod, saʼb afgor, nesh, resh koʻshish, takbiri fano** kabi murakkab soʻzlar berilgan. Soʻzlar “Lison ut- tayr” kitobida olingan boʻlib 8-sinflar uchun bunday mumtoz matn bilan ishlash ogʻirlik qiladi. Bunday mumtoz matnni tahlil qilishni universitet oʻquvchilari ham qiynalishadi. Lugʻatlarni berishda sinflar darajasiga qaralishi kerak, murakkab soʻz va matnlarni darslikda berilishi oʻquvchilarni ham zeriktiradi ham oʻrganish ishtiyoqini susaytiradi. Oʻquv lugʻatlarini ham shu asosida yosh darajasiga qarab shakllantirish maqsadga muvofiq boʻladi.

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## REVIEW OF THE FACTORS LEADING TO THE FALL OF THE SECOND REIGN OF AMIR SHER ALI KHAN

**Khalid Sadid**

Assistant professor, History Department, Art Faculty, Alberoni University

Author: Contact details for correspondence:

Email: khalidsadid6@gmail.com

### ABSTRACT

This article, entitled "Investigating the Factors Leading to the Fall of the Second Emirate of Amir Sher Ali Khan," addresses this topic from various perspectives. The period of Amir Sher Ali Khan's emirate is considered one of the sensitive and pivotal periods in the contemporary history of Afghanistan, drawing the attention of political elites and domestic and foreign scholars. The aim of the author is to analyze and respond to the collapse and downfall of the government of Amir Sher Ali Khan, as it reflects one of the significant issues in the contemporary history of Afghanistan. By reflecting and clarifying this issue, the future leaders of this land, which are the generations of today and tomorrow, will draw lessons from the past experiences for a dynamic future. The purpose of this research is to understand and identify the factors leading to the fall of the second Emirate of Amir Sher Ali Khan. In this regard, the research is organized into two sections: the first section focuses on internal factors leading to the downfall of the second Emirate of Amir, while the second section examines external factors, particularly the role of Britain. Finally, based on the hypotheses formulated in this research, the roles of internal and external factors in the collapse of Amir Sher Ali Khan's government are discussed, including the role of political elites, feudal lords and courtiers, as well as the instability and mistakes of Amir Sher Ali Khan and his fluctuating internal policies. This research is based on a descriptive and analytical method, and the materials and findings of this study are obtained through library research, aiming to identify the factors leading to the fall of the second Emirate of Amir Sher Ali Khan during this period.

**Keywords:** Afghanistan, Amir Sher Ali Khan, downfall, internal and external factors.

### Introduction

Amir Sher Ali Khan was the third son of Amir Dost Mohammad Khan. He ascended to the throne twice, from 1863 to 1866 and from 1868 to 1878 (Mohammadi, 2008: 37). He returned to Kabul for the



second time in 1878 after defeating Amir Mohammad Azam Khan and Sardar Abdul Rahman Khan in the Battle of Ghazni, re-establishing his authority over Afghanistan (Mirzadeh, 2020: 84-90). His second emirate, from 1868 to 1878, is considered one of the turning points in the contemporary history of Afghanistan, as it led to a series of transformations in the country's political, economic, social, and cultural structures. Among his most notable actions were the establishment of the first six-member cabinet, the creation of a disciplined army of five thousand soldiers, the founding of a printing press for disseminating proclamations and orders, the establishment of national and military schools, the establishment of the first postal and telegraph office, and the formation of a twelve-member council (Pamir, 2021: 271-272). However, due to his inconsistent domestic policies, nepotism, inappropriate appointments, lack of coordination among his political elites, familial hypocrisy, incomplete understanding of spies and English sympathizers, and interference from major contemporary colonial powers, especially Britain, his regime collapsed after a decade. Both internal prominent factors and external influences led to the downfall of his second emirate, as the constant rivalry and interference of Russia and Britain in Afghanistan's internal affairs have historically led to the downfall and collapse of contemporary Afghan regimes, with most governments in the country facing defeat and collapse due to unprofessional politics and misguided diplomacy in the past century. Based on this, the key issue of the present research is to identify the factors that led to the downfall of Amir Sher Ali Khan's second emirate.

There have been valuable studies on various aspects of the second emirate of Amir Sher Ali Khan; however, many of these studies either lack comprehensive and accurate information regarding its downfall or are scattered and non-descriptive and analytical. Therefore, I have examined and analyzed the factors leading to the collapse of Amir Sher Ali Khan's second emirate on both internal and external levels.

The identification of the factors leading to the downfall of Amir Sher Ali Khan's second emirate marks a significant milestone for cultural elites and domestic and foreign scholars. The children of today and the future of the country need a thorough understanding of this period to ensure the progress and development of the nation. Reflecting on this issue is crucial for the future architects of this land, as they will draw invaluable lessons from the past for a dynamic future. Furthermore, research on this matter can offer fresh and novel insights for Afghanistan's educated youth.

I felt a compelling need to thoroughly identify, analyze, and dissect the factors leading to the collapse of Amir Sher Ali Khan's second emirate if we aim to steer our country, Afghanistan, towards political stability and development. Only by carefully examining the past



can we act more judiciously and accurately now, as Ahmad Kasravi, the Iranian historian, aptly said, "A nation that does not know its history is doomed to repeat it."

This article, which investigates the factors behind the collapse of Amir Sher Ali Khan's second emirate, aims to comprehensively identify and understand the reasons for the downfall of his reign in Afghanistan. Why did Amir Sher Ali Khan's second emirate collapse? What roles did internal and external factors play in the downfall of his regime?

### Internal and External Factors in the Fall of the Second Emirate of Amir Sher Ali Khan

#### 1. Polygamy and Power Division under Amir Dost Mohammad Khan and Its Effects

Several factors contributed to the downfall of Sher Ali Khan's second reign, one of which was related to the polygamous nature of his father, Amir Dost Mohammad Khan. Like Timur Shah Durrani, Amir Dost Mohammad Khan had multiple wives, resulting in numerous offspring. Unfortunately, Amir did not find the opportunity to properly educate and raise his children in family matters. Consequently, each of his sons became a source of significant headaches for the people and the political system of Afghanistan. The most significant adverse consequences can be seen in Amir Sher Ali Khan's governance. Another significant political mistake Amir Dost Mohammad Khan made alongside polygamy was appointing his sons to key provinces, particularly those with ethnic ties through their mothers or residents. For instance, Muhammad Afzal Khan as the governor of Turkistan, Muhammad Azam Khan as the governor of Kandahar, Sher Ali Khan as the heir apparent, Muhammad Amin Khan as the governor of Qandahar, Muhammad Sharif Khan as the governor of Farah, Wali Muhammad Khan as the governor of Aqcha, Faiz Muhammad Islami Khan as the governor of Ghur, and Muhammad Hassan Khan from the Hazara lineage in the Hazarajat. However, with this mistake, Amir paved the way for disobedience to central government authority and laid the foundation for internal conflicts, similar to Minister Fath Khan's role in the country (Farhang, 2005: 348-362). Therefore, when Amir Sher Ali Khan ascended to the throne, he faced abundant problems from his family members and brothers (Zamani, 2019: 79). On the very day the sermon was delivered in Herat in the name of Amir Sher Ali Khan, all his brothers who had come to Herat with their deceased father fled to various provinces and rebelled against him where they held authority (Ataie, 2005: 138). It is worth mentioning that unfortunately, Amir Sher Ali Khan repeated the history of his father's significant mistake. He also relied heavily on his family members, dividing important governmental duties among them. However, most of them lacked competence and





capability to carry out their assigned tasks, being weak and incompetent individuals who created grounds for government crises and instability (Pamir, 2021: 276).

## 2. Weak and Unstable Domestic Policies of the Amir

Amir Sher Ali Khan was not a successful individual in domestic politics, nor was he a good administrator. He failed to establish domestic and foreign policies, as well as familial relationships, based on his own real interests or the benefit of the country, which led to an inability to prevent external threats. Although he harbored important aspirations for strengthening the central government and modernizing certain aspects of the country, he lacked the qualities necessary to achieve such transformations. This deficiency ultimately resulted in the failure of his grand plans and objectives both domestically and internationally. In his domestic administration, Amir was authoritarian and self-willed, but lacked the ruthlessness and severity to control most Eastern governors (Sedid, 2021: 65). Although Amir Sher Ali Khan was a progressive and enlightened individual with good intentions for the country, his weak administration often sabotaged his plans. His impulsive nature and lack of stability often rendered his schemes unsuccessful. These failures not only caused significant problems for himself and created internal conflicts within his family but also led to failures in foreign policy, allowing the British to take advantage of his weaknesses and invade Afghanistan for the second time. The people of Afghanistan did not rise against them as they did not do so in the first invasion, and the British did not abandon Afghanistan (Farhang, 2005: 394-396).

A prominent factor illustrating Amir Sher Ali Khan's weak domestic policy was his tendency towards self-will and his incomplete understanding of the foreign policies of European countries. He not only lacked strong and unwavering trust in his army and cabinet members but also, in many cases, disregarded the importance of consulting and heeding the advice of informed and loyal counselors. When the British invaded Afghanistan for the second time, Amir, having lost his courage, sought to abandon the capital in hopes of Russian cooperation, opting to move to Mazar-i-Sharif. Despite wise counsel from knowledgeable figures in his court advising him to trust in the powerful forces of the Afghan people and the bravery of his fifty-thousand-strong armed forces, he chose to abandon Kabul and move north. Consequently, the country fell into a political vacuum, creating more opportunities for British interference and invasion. This hasty move by Amir Sher Ali Khan not only occurred when he had sufficient human resources and military capabilities at his disposal but also when, several months earlier, Britain, Germany, Italy, Austria, France, and Russia had raised the issue of Afghanistan and India at a conference in June 1878. As a result of this conference, Russia had pledged not to attack Afghanistan as long as it was



recognized as an independent country and not threatened by India. This decision and commitment undoubtedly undermined Russian help and cooperation for Amir Sher Ali Khan. However, it is highly probable that Amir was not sufficiently aware of this political shift between the two major powers of that time and futilely pinned his hopes on Russian authorities. It was on this basis that Kaufman, the governor of Turkestan, explicitly stated in a letter to Amir that he should abandon the idea of leaving the Russian territory (Pamir, 2021: 276).

The greatest challenge and weakness of the Amir's emirate was family hypocrisy, as it shook the foundations of his government. In the first phase of his emirate, his brothers hindered the establishment of stability and security, and in the second phase, his sons took on this responsibility. The reason for this was the tribal nature of the government system. On the other hand, the weakness of Amir's judgment and lack of foresight led to hypocrisy, animosity, and enmity even within his own family. Similar to Shah Jahan Gorkani, differences arose among his children, initially favoring his eldest son, Muhammad Ali Khan, as he was the heir and successor. However, Muhammad Ali was killed in a battle with Muhammad Amin Khan near Kandahar, plunging him into grief and mourning for several weeks. Moreover, another significant mistake of Amir Sher Ali Khan was favoring his eldest and capable sons, Muhammad Yaqub Khan and Muhammad Ayub Khan, over his younger son, Prince Abdullah, who was dearly loved by his mother, Aisha, the daughter of his uncle Amir Afzal Khan. Abdullah, the seven-year-old son of Amir, was considered as the successor due to his mother's request. This action of the Amir caused distress and disappointment among all his young sons. Consequently, Amir Ayub Khan sought refuge in Iran, while Amir Yaqub Khan left the court and rushed to Herat, where he seized control and took over the governorship for a while. Another significant injustice and unfairness of the Amir among his sons not only led to family hypocrisy but also paved the way for foreign interference in Afghan affairs (Pamir, 2021: 275-276).

### 3- Lack of moderation and stability in foreign policy

Undoubtedly, adopting a suitable and balanced foreign policy can have a positive impact on the stability of a political system. This becomes particularly crucial when a country has a powerful and influential neighbor, as the type of foreign policy adopted towards that country can either foster understanding or lead to confrontation. Furthermore, adopting a foreign policy towards other countries, especially powerful neighbors, should be based on national interests and devoid of excessive emotions or enmity, in a logical and proportional manner considering both potential and actual capabilities and resources.



Although initially Amir Sher Ali Khan sought to maintain balance and equilibrium in international politics and relations with Russia and Britain, aiming for neutrality and balance in his foreign policy to attract more friends and strengthen the defense and security of his government, thereby developing independent relations with the outside world, this balance was not always maintained consistently. Like the foreign policy of Sardar Mohammad Daoud Khan, it sometimes leaned towards one side and sometimes towards the other. This unbalanced foreign policy led Afghanistan to confront Britain with enmity. On the other hand, Amir Sher Ali Khan had positioned the country in the hope of Soviet support in confrontation with Britain. This lack of balance in foreign policy, given the intense competition between the two rival empires, led to British dissatisfaction with the government of Afghanistan, and given Britain's exceptional influence and penetration in Afghan affairs over several decades, it made Britain pessimistic about Amir Sher Ali Khan's government.

Another manifestation of the lack of moderation in Amir's foreign policy was his unrestrained anger and use of harsh words against the British. Although Amir was a progressive thinker, his anger often reached a point of irrationality, to the extent that when he went home, he would not leave for a week and would be treated rudely, shouting loudly that the English wanted to belittle him among my people (Ataïi, 2005: 140).

Moreover, Amir Sher Ali Khan never agreed with all the policies of the British from the beginning to the end and harbored a strong hatred for the British. This animosity was openly expressed to British representatives, and Amir's open disdain for the British caused significant problems for him, especially as the British were very cunning and alert opponents. The British initially wanted Amir Sher Ali Khan to accommodate them in his Chout, but when they realized that Amir Sher Ali Khan was reluctant to follow a specific line and was not willing to bow to them, they once again resorted to the old version, the version where the sons of Sardar Payanda Khan were assassinated and blinded by themselves and then expelled from the field. After them, the sons of Sardar Dost Mohammad Khan were put to death, and they were so suppressed that they had no movement and activity left, and now they have adapted this plan for the children of Amir Dost Mohammad Khan as well (Ataïi, 2005: 37-38).

Amir Sher Ali Khan was suspicious of England's behavior in the region in his foreign policy and showed favor to Russia, repeating his father's (Amir Dost Mohammad Khan) historical mistake, especially in response to Lord Lytton's request for the reopening of British representation in Kabul and Herat, as well as receiving news of Amir Sher Ali

Khan's dealings with General Kaufman in Tashkent and receiving evidence of General Stolietoff's presence in Kabul, which convinced England that Amir Sher Ali Khan had sided with the Russians, and this gave them a good excuse to invade Afghanistan once again and bring down the regime of Amir Sher Ali Khan (Ansari, 2012: 148).

#### 4- The Role of Feudals and Tribal Leaders

In our beloved country, Afghanistan, feudal lords and tribal leaders have always enjoyed power in tandem with the government. This phenomenon traces back to the long-standing autonomy and independence of tribal communities. Each feudal lord and tribal leader considered themselves as autonomous rulers and independent figures. In this land, given its tribal structure, the power and influence of the government have always been influenced by the power and influence of the tribes.

In Afghanistan, tribal leaders, landowners, and prominent tribal figures have been staunch and long-standing opponents of the central government, often refusing to obey and submit to central authority and instead engaging in lawlessness and defiance. Because the power of the government does not originate from the capital but rather from the power and influence of feudal lords and tribal leaders. Based on this, in terms of military and combating external pressures or foreign forces, the government has often relied on tribal and feudal forces as a means of confrontation and resistance against external forces. Given the prominent role of feudal lords and tribal leaders, they have been instrumental in mobilizing popular movements for confrontation and confrontation with foreign forces (Mirzai, 2014: 80-81).

Accordingly, Afghan rulers have always sought to reduce the power and influence of tribal leaders and feudal lords in favor of the central government. For example, Ahmad Shah Durrani sought to reduce the power of tribal leaders by creating a unified state and keeping tribal leaders engaged in wars. He relied more on the influence of his wars abroad to consolidate his power domestically. If these wars were accompanied by victories, his name would be glorified, and maintaining the loyalty of tribal leaders and feudal lords through rewards and honors would become possible. Similarly, Amir Abdul Rahman Khan, a self-reliant ruler, sought to suppress the power and influence of powerful tribal leaders through the establishment of a strong and disciplined army using strict strategies.

However, all Afghan kings from Ahmad Shah Durrani to Amir Abdul Rahman Khan have not succeeded in separating their rule and authority from the influence and power of tribes and feudal lords and in establishing their sovereignty outside the influence of tribes and feudal lords. Instead, during this period, tribal leaders have not only preserved their long-standing autonomy but also succeeded in maintaining their military power





and independence from the central government in the political structure of Afghanistan. This trend continued until the era of Amir Sher Ali Khan.

#### 5- Lack of Intellectual Coordination Among Political Elites in Government

One of the pillars of stability and sustainability in a political system is the unity and coordination among political elites of a government. In case of lack of coordination and intellectual coherence among political elites, the government becomes destabilized and loses its political stability. Historical experiences and realities indicate that the development of reforms results from the products of stability in society. This itself requires rationality, wisdom, coordination, and consensus among political elites. Systematizing the behavior of institutions and individuals is one of the important levels of human civilization. If there are no rules, people do whatever they want, and tradition disappears for no reason. It is not surprising that in countries undergoing transformation, when the management of an institution changes, all methods, traditions, and rules also change. The main reason for this situation is that among individuals engaged in a particular cause, there are no common principles, and each person has their own methods, refusing to follow others. The most severe form of this situation is in politics, where if there are no common goals and rules among politicians and political elites in the government, there should be no hope of effectiveness and success in issues. Therefore, systematizing behaviors, traditions, and methods is the basis of coordination and coherence, and after that, we witness development from all sides. The experience of industrialized countries in the world shows that the role of the system and government is more important than ever in moving towards reforms and development. In sociology and political science, it is the government that is highlighted as an independent player in analyses because the first condition for reaching such countries is political elites who have intellectual cohesion and political consistency. This is not achieved until one of its important factors, namely intellectual cohesion and political consistency among political elites, is observed, and there is no gap and contradiction within the government front. Otherwise, towards reforms, development, and progress in a country is not possible (Jalali, 2010: 2).

Based on this, one of the reasons for the fall of the government of Amir Sher Ali Khan was the lack of coordination among political elites, especially among the courtiers. According to Karim Pekar, factionalism among senior officials posed another challenge to the successes of Amir Sher Ali Khan. Family and tribal rivalries also played a role in the fall of the Amir's second regime (Pamir, 2021: 275-277).



## 6- Incompetent Governance of Government Appointees

One of the fundamental factors that led to the downfall of Amir Sher Ali Khan's government was his nepotism and appointment of incompetent and corrupt officials in governance affairs. Amir Sher Ali Khan excessively relied and trusted his family members, assigning important governmental duties to them, such as Sardar Walimohammad Khan Lati, Sardar Mehrdel Khan, Sardar Mohammad Eslam Khan, Sardar Mohammad Hassan Khan, Sardar Abdullah Khan, Sardar Yayha Khan, and others. These individuals not only lacked the desire for the survival of Amir's rule but were also considered loyalists and servants of the British, especially during the initial British occupation. Historians even write that Amir appointed one of his nephews named Sardar Fath Mohammad Khan as the governor of Herat province, although he lacked any qualifications for governance. Whatever clothes he wore, they were adorned with gold and silk from Herat's wealth, and apart from this, he did nothing else (Pamir, 2021: 276).

Furthermore, the individuals appointed by Amir Sher Ali Khan to key administrative positions were not those who were committed to serving the people, developing the country, ensuring justice, and protecting the country's borders from foreign invasions. Instead, their goal was merely to collect taxes and products from peasants and merchants, often through coercion and tyranny, and to seize the property of others and rule over the inhabitants of the provinces (Atai, 2005: 174).

## 7- Excessive Trust of Amir in Mysterious Foreign Elements within the Court

The incomplete knowledge of Amir Sher Ali Khan about spies and agents of the British is one of the important factors in the collapse of his second reign. Due to his incomplete and inaccurate knowledge of the elements within the court, Amir Sher Ali Khan excessively trusted a number of Indian Muslim elements residing in Kabul who were actually British spies, bringing them close to his court. Among them were Abdul Majid, Gholam Nakhshband, Fath Ali, Karim Bakhsh, Qazi Qadar, and others (Pamir, 2021: 276).

## 8- The Role of the British in the Fall of the Amir Sher Ali Khan's Sultanate

The British policy strategy in Afghanistan aimed to keep the country fragmented, weak, and separate from the world, devoid of political independence and international relations. They sought to prevent the spread of modern civilization and culture, keep the nation in hypocrisy and internal conflicts, make governments detested by the people, force governments to resort to them, and, at the same time, introduce the country to the world through their

extensive propaganda as ignorant, barbaric, thieving, and deceitful, without any historical virtue or honor.

Therefore, it is not contrary to reality that the government of Britain was indifferent to the fall of Amir Sher Ali Khan's rule. The British government did not recognize Amir Sher Ali Khan as a friend or ally and was concerned about his proximity to Russia. In addition to military aggression against Amir Sher Ali Khan's regime, the British government transferred its own individuals and spies disguised as Indian Muslims to Kabul and Amir's court, and these individuals regularly reported all events within the court to Britain. Although Amir Sher Ali Khan, like his father (Amir Dost Mohammad Khan), sought good relations with Britain after ascending the throne, the British government, fearing the proximity between Afghanistan and Russia, became alarmed. The important and fundamental point is that Amir Sher Ali Khan lacked sufficient experience in foreign policy, and on the other hand, the Shah's advisors lacked initial information about global politics. Amir could not establish good relations with Britain after gaining sovereignty, and his proximity to Russia became a cause for concern for the British government. Despite all the deficiencies and shortcomings, it cannot be denied that the role of British intelligence and military aggression played a significant role in the fall of Amir Sher Ali Khan's rule for the second time (Pamir, 2021: 240).

### Conclusion

From the analysis of the factors surrounding Amir Sher Ali Khan, it is concluded that both internal and external factors played a major and fundamental role in the downfall of his government. A deep examination of Amir Sher Ali Khan's governance period reveals that internal and external factors simultaneously contributed to the collapse of his regime. It was the internal factors that paved the way for foreign interventions in Afghanistan and ultimately led to the weakening and downfall of Amir Sher Ali Khan's second reign. When considering the internal factors and mistakes of Amir Sher Ali Khan in reform and governance affairs, it becomes apparent that internal factors such as injustice and unfairness towards his children and family members, nepotistic appointments based on incompetence and lack of governance talent, reliance on dubious advisors with British leanings, lack of coordination among political elites, incomplete and inaccurate knowledge of mysterious individuals and British spies in governance affairs, fluctuating and inconsistent domestic policies in administrative matters, the role of multiple wives of Amir Dost Mohammad Khan and power distribution among family members, nepotism and excessive trust of Amir in his family members, as well as the failure to adopt a moderate and



desirable foreign policy in foreign relations were among the major and fundamental factors leading to the collapse of Amir Sher Ali Khan's second reign.

From the course of analysis and examination of this research, it can be concluded that alongside internal factors, external factors, especially the prominent role of Britain, in the fall of Amir Sher Ali Khan's government is undeniable. In reality, internal factors provided the groundwork and platform for external factors, namely British interventions in Afghanistan's internal affairs.

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## O'ZBEK DIALEKTAL NUTQ SINTEZATORINI YARATISHDA XORIJIY TAJRIBALAR TAHLILI

**Ro'za Toliboyevna O'rinboyeva**

Mirzo Ulug'bek nomidagi O'zbekiston Milliy universiteti magistranti

[orinboyevaroza@gmail.com](mailto:orinboyevaroza@gmail.com)

**Durdona Gurbanmurat qizi Allaberdiyeva**

[durdonallaberdiyeva39@gmail.com](mailto:durdonallaberdiyeva39@gmail.com)

Mirzo Ulug'bek nomidagi O'zbekiston Milliy universiteti magistranti

### ANNOTATSIYA

Har tomonlama taraqqiyotga erishgan asrimizda kompyuter texnologiyalaridan unumli foydalanish soha rivojini ta'minlab beruvchi vositaga aylandi. O'zbek tili uchun nutq sintezatorini yaratish masalasi kompyuter lingvistikasi mutaxassislari oldidagi dolzarb vazifalardan biridir. Ushbu maqolada o'zbek tili uchun nutq sintezatorini yaratishning dastlabki bosqichi yoritib beriladi.

**Kalit so'zlar:** sintezator, transkripsiya, akustik, artikulyar, text-to-speech, lingvistik ta'minot, prosodiya, dialekt.

### ABSTRACT

Effective use of computer technologies has become a means of ensuring the development of the industry in our century, which has achieved all-round development. The question of creating a speech synthesizer for the Uzbek language is one of the urgent tasks before specialists in computer linguistics. This article describes the initial stage of creating a speech synthesizer for the Uzbek language.

**Keywords:** synthesizer, transcription, acoustic, articulatory, text-to-speech, linguistic support, prosody, dialect.

### KIRISH

Ilm-fan taraqqiy etgan, kompyuter texnologiyalari rivojlangan, har jabhada elektron axborotlarga ehtiyoj seziladigan XXI asrda kompyuter lingvistikasi muhim ahamiyatga ega. Ko'plab sohalar uchun boy manba bo'la oladigan til korpuslarini yaratish va ularni takomillashtirish bugungi ta'lim jarayonining sifatini oshirish, o'rganuvchilarga til o'qitishning yangi uslub va tamoyillarini tatbiq etish, qolaversa, jamiyatning barcha qatlamlari uchun til o'rganishni osonlashtirishda samarali vositalardan biri bo'lib xizmat qiladi. Shuningdek, o'zbek tilining nutqiy sintezatorini yaratish, uning



uchun yetarlicha darajadagi ma'lumotlar bazasini to'plash ushbu soha doirasidagi dolzarb mavzulardan biri hisoblanadi. Ushbu maqolada jahon tajribalaridan foydalangan holda o'zbek nutq sintezatori uchun muayyan dialekt asosidagi lingvistik ta'minot yaratish masalalari hamda uning dolzarbligi yoritib berilgan.

Nutq sintezatori – bu muayyan bir tildagi matnlarni audio shaklda o'qib beruvchi dastur. Bu dastur uchun lingvistik ta'minot yaratish jarayoni fonemalarni inventarizatsiya qilish, matnni fonemaga aylantirish, prosodiyani modellash, leksikani rivojlantirish, tilga xos qoidalarni kiritish, sinov va takomillashtirish kabi bosqichlarni o'z ichiga oladi. Bu vazifalarni bajarish uchun avvalgi jahon tajribasini hamda hozirda o'zbek mutaxassislari tomonidan olib borilayotgan tadqiqot ishlarini tahlilga tortdik.

## ADABIYOTLAR TAHLILI VA METODLAR

Jahon ilm-fanida nutq sintezatorini yaratish g'oyasi o'tgan asrlarda ilgari surilgan. Dastlabki urinishlar sifatida rus professori Kristian Kratzenshteyn ishlarini keltirishimiz mumkin. U 1779-yilda Sankt-Peterburgda beshta uzun unlilar (/a/, /e/, /i/, /o/ va /u/) o'rtasidagi fiziologik farqlarni tushuntirib berdi. Ularni sun'iy ravishda ishlab chiqarish uchun maxsus apparatlar ham yaratdi: u yaratgan akustik rezonatorlar insonning ovoz yo'liga o'xshash bo'lib, musiqa asboblari kabi tebranish qamishlari bilan faollashtiriladi [2]. 1791-yilda Vena shahrida Volfgang fon Kempelen, 1800-yillarning o'rtalarida Charlz Uitston, 1800-yillarning oxirlarida Aleksandr Grem Bell, 1922-yilda Styuart, 1932-yilda yapon tadqiqotchilari Obata va Teshima kabi olimlar tomonidan turli xil rezonatorlar yaratilgan. Ular har tomonlama bir-birini to'ldirib, mukammallashtirib borgan. Dastlabki amaliy natija 1939-yilda Nyu-York shahrida bo'lib o'tgan Jahon ko'rgazmasida Gomer Dadli tomonidan namoyish etilgan bo'lib, u Voder (Ovoz kodlovchi) deb nomlangan [3]. U akustik nutq signallarini sintez qilish vazifasini bajargan. Keyinchalik kompyuterga asoslangan dastlabki sintez yaratildi. 20-asr o'rtalarida raqamli kompyuterlarning paydo bo'lishi nutqni sintez qilishning yanada murakkab usullariga yo'l ochdi. 1960 va 1970-yillarda tadqiqotchilar formatlar, tovush balandligi va davomiylik kabi akustik parametrlarni boshqarish orqali nutqni yaratish uchun kompyuterlardan foydalanishni boshladilar. Ular sintez rivojlanishi jarayonini uchta asosiy toifaga bo'lib tushuntirdilar:

1. Akustik modellar;
2. Artikulyar modellar;
3. Tabiiy nutqni kodlash asosidagi modellar [5].

Akustik va artikulyar modellar uzoq rivojlanish tarixiga ega bo'lib, tabiiy nutq modellari esa biroz yangiroq soha hisoblanadi.



Bu soha taraqqiyotining dastlabki yillarida akustik terminal analog sintezatori, asosan, tijorat tizimlarida qoʻllangan. Ammo oʻsha paytda ovoz sifati foydalanish uchun yetarli darajada emas edi. Aynan shu tufayli kodlashga asoslangan yondashuvlarga koʻpchilik tomonidan katta qiziqish bildirildi. Shundan soʻng artikulyar modellar uzluksiz ishlab chiqildi. Artikulyar sintez, tabiiyki, nutq harakatining oʻzini chuqur tushunishni talab qiladi, kodlashga asoslangan modellar esa bunday bilimlardan faqat cheklangan darajada foydalanadi. Barcha sintez usullari muayyan darajada nomaʼlum narsalarni modellashtirishi kerak. Nutqni tushunishda ham, nutqni ishlab chiqarishda ham hozirgi nutq texnologiyasidagi tendensiya bilimlarni aniq shakllantirishdan qochish va tizimni rivojlantirishga yordam beradigan avtomatik usullardan foydalanish muhim ahamiyatga ega [5].

1970-1980-yillarga kelib jadal rivojlangan soha text-to-speech – matndan nutqqa (TTS) tizimlari boʻldi. Tadqiqotchilar yozma matnni sintezlangan nutqqa aylantirish uchun algoritmlar va modellarni yaratishga eʼtibor qaratdilar. Bu tizimlar koʻpincha konkatenativ sintezga (oldindan yozib olingan nutq segmentlarini birlashtirish) yoki formant sinteziga (ovoz yoʻlining matematik modellari asosida nutq hosil qilish) tayangan.

1980-1990 yillar davomida sintezlangan nutqning tabiiyligi va tushunarligini yaxshilashda sezilarli yutuqlarga erishildi. Bu lingvistik modellarni takomillashtirish, prosodiyani (ritm, intonatsiya va stress) oʻz va odamga oʻxshash ovozlarni yaratish uchun mashinani oʻrganish usullaridan foydalanishni oʻz ichiga olgan [4].

Umuman olganda, nutq sintezatori uchun lingvistik taʼminotni yaratish muayyan tilning fonetikasi, fonologiyasi va prosodiyasini chuqur tushunishni, shuningdek, hisoblash lingvistikasi va nutq texnologiyasi boʻyicha tajribani talab qiladi.

Xorijiy tadqiqotlar tahlilidan kelib chiqib, oʻzbek nutq sintezatori uchun muayyan (masalan, Samarqand shevasi) dialekt asosida lingvistik taʼminot yaratish jarayonini quyidagi bosqichlarga ajratamiz:

1. Dastlab Samarqand shevasidagi alohida talaffuz qilinadigan fonemalar ajratib olinadi;
2. Shevadagi istalgan matnni fonemalarga aylantirib beruvchi tizim ishlab chiqiladi;
3. Samarqand shevasiga asoslangan soʻzlarning yirik hajmli maʼlumotlar bazasi yaratiladi hamda maxsus transkripsiyada ifodalanadi;
4. Mazkur dialektning talaffuziga taʼsir etuvchi oʻziga xos qoidalar aniqlanadi;
5. Yaratilgan lingvistik baza algoritmlar yordamida dasturlashtirilib sinovdan oʻtkaziladi.

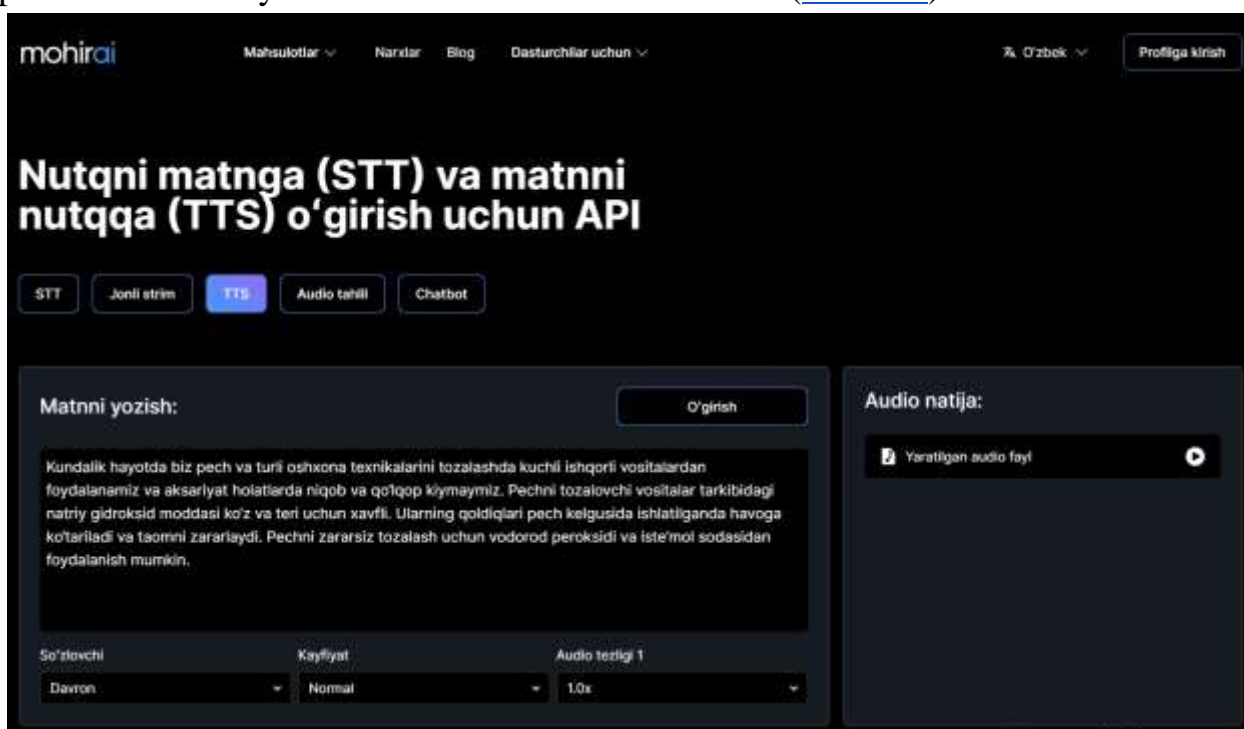
Professor N. Abduraxmonova tomonidan nutq sintezatori uchun ma'lumotlar bazasini yaratishda quyidagi tamoyillarga tayanilishi aytib o'tiladi [1]:

1. So'z va uning shakllariga asoslangan texnologiya (bu flektiv tillar uchun mos keladi);

2. Bo'g'inlarga asoslangan texnologiya (bu aglyutinativ tillar uchun mos keladi).

Ushbu vazifalardan kelib chiqib bir necha guruh mutaxassislar o'zbek tili uchun nutq sintezatori yaratish bilan shug'ullanib kelmoqda. Xususan, Mohirdev AI

MCHJ tomonidan o'zbek tilidagi matnni nutqqa hamda jonli strim yoki fayl ko'rinishidagi nutqni matnga o'giruvchi platforma yaratilgan. Ushbu havola orqali platforma imkoniyatlari bilan tanishishimiz mumkin ([mohir.ai](https://mohir.ai)).



Toshkent axborot texnologiyalari universitetida Muhammadjon Musayev boshchiligidagi guruh ham nutq sintezatorining o'ziga xos xususiyatlarini o'rganish hamda uning takomili ustida ish olib bormoqda. Bu boradagi uning "Sun'iy intellekt algoritmlariga asoslangan nutqni aniqlash texnologiyalari", "Advanced feature extraction method for speaker identification using a classification algorithm", "USC: An Open-Source Uzbek Speech Corpus and Initial Speech Recognition Experiments", "Automatic Recognition of Uzbek Speech Based on Integrated Neural Networks", "Development of integral model of speech recognition system for Uzbek language" kabi ko'plab maqolalari e'lon qilingan [7].

2021-yilda filologiya fanlari doktori Munavvara Qurbonova tomonidan o'zbek nutq sintezatori yaratildi. Ushbu loyiha, asosan, ko'zi ojizlar uchun o'zbekcha matnlar bilan ishlashga



mo'ljallangan. [uznutq.com](http://uznutq.com) sayti orqali bu dastur bilan tanishishimiz mumkin [6].

## XULOSA

Xulosa qilib aytganda, o'zbek dialektal nutq sintezatorini yaratish uchun xorijiy tajribalarga tayaniladi. Boshqa mamlakatlarda qo'llaniladigan yondashuv va metodologiyalarni o'rganish orqali biz eng yaxshi amaliyotlarga hamda oldini olish mumkin bo'lgan xatolarni aniqlashga muvaffaq bo'lamiz. Xorijiy tajribalarning integratsiyalashuvi nutq sintezi texnologiyasi haqidagi tushunchamizni boyitdi va bu sohada keyingi yutuqlarga yo'l ochdi. O'zbek dialektal nutq sintezatorini yaratish va amaliyotga tatbiq etish uchun jahon tajribasini o'rganish va xalqaro ekspertlar bilan hamkorlikni davom ettirish zarur.

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## ОБОСНОВАНИЕ ГЕОМЕТРИЧЕСКИХ ПАРАМЕТРОВ ФИЛЬТРОЭЛЕМЕНТОВ ВОЗДУХООЧИСТИТЕЛЕЙ КОМПРЕССОРОВ АВТОМОБИЛЕЙ-ЦЕМЕНТОВОЗОВ

**Каримжон Исмаилович Ибрахимов**

доцент, кафедры «Автомобиль и автомобильное хозяйство», ТГТрУ, к.т.н.

### АННОТАЦИЯ

На основе нами ранее проведенных лабораторно стендовых испытаний был выбран фильтрационный материал для изготовления фильтроэлемента воздушного фильтра. В работы были обоснованы параметры цилиндрического фильтрационного элемента: площадь фильтрующей шторы, наружный и внутренний диаметры, высота, длина и ширина фильтрующей шторы, ширина гофров и их количество. Основными исходными данными для обоснования параметров фильтроэлемента являлись: расход воздуха, площадь фильтрующей шторы, планируемая продолжительность работы до сервисного обслуживания, реальная запыленность воздуха, удельная поверхность пыли, вид фильтрующего материала. Из выбранного материала были изготовлены фильтроэлементы для воздушного фильтра компрессора автоцементовоза. В работе показано, что максимальная площадь фильтрующей шторы в заданном габарите цилиндрического фильтроэлемента будет при соотношении его наружного и внутреннего диаметров 1:2, если шаг между гофрами постоянный. Помимо этого, расчетным методом обоснован оптимальный шаг гофров фильтрующей шторы.

**Ключевые слова:** воздушный фильтр, фильтроэлемент, фильтрационный материал, расход воздуха, скорость фильтрации, продолжительность работы, реальная запыленность воздуха, удельная поверхность пыли, шаг гофров, автоцементовоз, сервисное обслуживание.

### ABSTRACT

Based on our previously conducted laboratory bench tests, we selected a filtration material for the manufacture of an air filter filter element. The work substantiated the parameters of a cylindrical filtration element: area of the filter curtain, outer and inner diameters, height, length and width of the filter curtain, width of the corrugations and their number. The main initial data for justifying the parameters of the filter element were: air flow, area of the filter curtain, planned duration of operation before service, actual dust content of the air, specific surface area of the dust, type of filter material. A filter element for the air filter of the cement truck compressor was made



from the selected material. The work shows that the maximum area of the filter curtain in a given size of a cylindrical filter element will be when the ratio of its outer and inner diameter is 1:2, if the pitch between the corrugations is constant. In addition, the optimal pitch of the filter curtain was substantiated by the calculation method.

**Keywords:** air filter, filter element, filtration material, air flow, filtration rate, duration of operation, real dust content, specific dust surface, spacing of corrugations, truck truck, service.

## ВВЕДЕНИЕ

На основании результатов проведенных исследований для изготовления опытных образцов фильтрационных элементов фильтра компрессора РК-6/1 пневматической системы автомобилей-цементовозов С-972 был выбран гидрофобный картон КТФВ-155 с условной пористостью 155 мм вод ст.

Конструкция фильтрационного элемента, предназначенного для очистки воздуха, может иметь самые разнообразные формы: цилиндрическую, коническую, прямоугольную, панельную (плоскую), эллипсную и т.д. Применение фильтрационного элемента соответствующего вида прежде всего определяется возможностями компоновки и конструктивными схемами воздушного фильтра сухого типа [1,2,3].

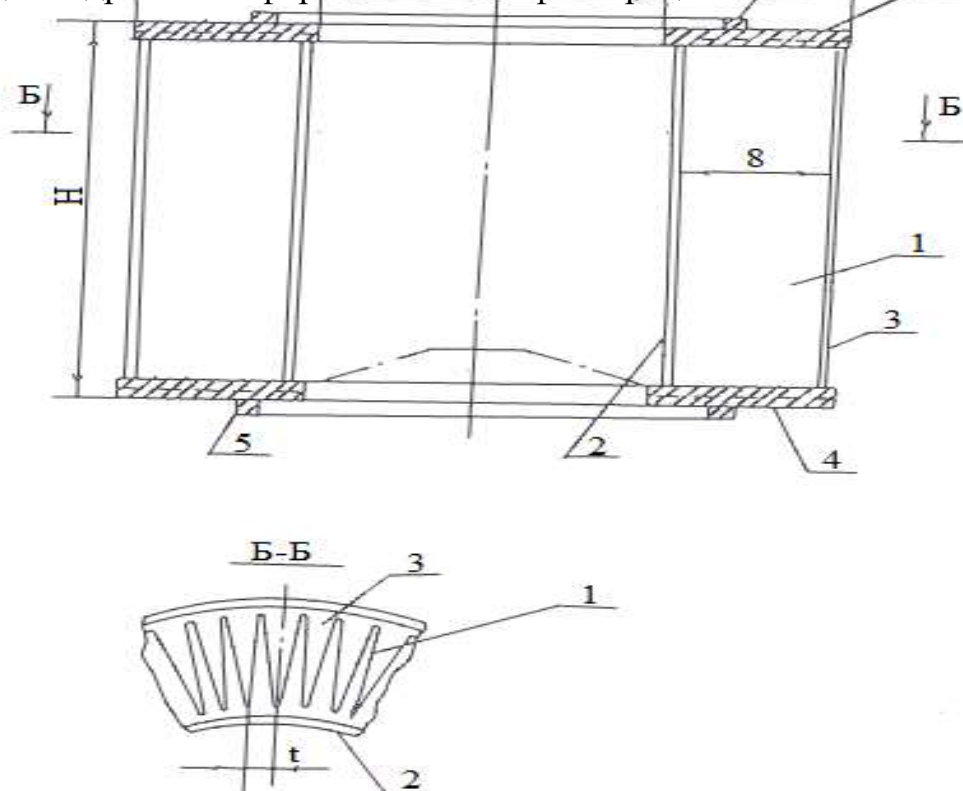
Широкое распространение получили фильтрационные элементы цилиндрической формы со звездообразной гофрированной шторой, позволяющие в заданном объеме разместить большую площадь фильтрационного материала. Основными преимуществами таких фильтроэлементов по сравнению с другими являются компактность конструкции, технологичность изготовления, высокий коэффициент удельной поверхности, надежность уплотнения, подобие формы цилиндрических фильтроэлементов корпусам инерционно-масляных фильтров, что позволяет осуществить их взаимозаменяемость при установке на ротационных компрессорах[3,4].

Цилиндрический фильтроэлемент (рис. 1) состоит из звездообразной гофрированной картонной шторы 1, которая заключена между внутренней 2 и наружной 3 перфорированными обечайками.

Торцы обечаек и штор закрываются крышками 4 и заливаются специальным составом, уплотняющим и герметизирующим их. На крышках фильтроэлемента приклеиваются уплотнения 5, выполненные из губчатой или литой профилированной резины.



На основании анализа форм фильтрационных элементов, нами была выбрана цилиндрическая форма опытного фильтрационного элемента.



**Рис.1. Цилиндрический фильтрационный элемент:**

1-гофрированная картонная штора; 2,3-внутренняя и наружная предохранительные обечайки; 4-крышка; 5-резиновая прокладка.

Продолжительность или ресурс работы фильтрационного элемента до технического обслуживания зависит от расхода воздуха  $Q$ , запыленности воздуха  $\phi_1$ , величины удельной поверхности улавливаемой пыли  $S$ , площади шторы  $F$  и вида применяемого фильтрационного материала  $\rho$ . При заданной величине расхода воздуха  $Q_H$  активная площадь шторы фильтрационного элемента  $F$  определяется из условия неразрывности потока воздуха по формуле.

$$F = \frac{Q_H}{V} ; \quad (1)$$

где,  $V$  – скорость фильтрации или воздушная нагрузка на картон,  $\text{м}^3 / \text{м}^2 \cdot \text{ч}$ .

Как видно из формулы (1), воздушной нагрузкой в основном определяется требуемая поверхность шторы в фильтрационном элементе. При завышенных значениях  $V$  площадь шторы может быть настолько мала, что ресурс работы фильтроэлемента будет недостаточен. При слишком заниженных значениях  $V$  значительно возрастут габариты фильтроэлемента. С другой стороны, при проектировании фильтроэлементов воздушную нагрузку желательно выбирать так, чтобы выполнялось



условие ламинарности течения воздуха через фильтра-ционный материал.

Для цилиндрических фильтроэлементов определенных габаритов площадь фильтрующей шторы (см.рис.1) определяется по формуле

$$F = L * H ; \quad (2)$$

где,  $L, H$  – длина и высота шторы, м.

Длина фильтрующей шторы  $L$  определяется из выражения

$$L = 2 n B = n (O - d) ; \quad (3)$$

где,  $n = \frac{\pi d}{t}$  – число гофров картонной шторы, шт;

$t$  – шаг гофров фильтрующей шторы по внутреннему диаметру, м;

$B$  – ширина гофра, м;

$O, d$  – соответственно наружный и внутренний диаметр шторы, м.

Подставив в формулу (2) значения  $L$  и  $n$ , получим

$$F = \frac{\pi d}{t} (O - d) * H ; \quad (4)$$

Максимальная поверхность шторы (если  $O = \text{const}$ ) фильтроэлемента будет при  $dF / d(d) = 0$ ;

$$\frac{dF}{d(d)} = \frac{\pi H}{t} (O - 2d) = 0 ; \quad (5)$$

откуда  $O - 2d = 0$ ;  $d = 0,5O$ .

Из формулы (5) следует, что максимальная площадь фильтрующей шторы в заданном габарите цилиндрического фильтроэлемента будет при соотношении его наружного и внутреннего диаметров 1:2, если шаг между гофрами постоянный.

Подставив значение  $d$  в формулу (4), получим

$$F = \frac{\pi}{4t} O^2 * H ; \quad (6)$$

Приравняв левые части уравнений (1) и (6) и произведя соответствующие преобразования, находим

$$O = 2 \sqrt{\frac{t * Q_H}{\pi * V * H}} ; \quad (7)$$

или

$$H = \frac{4}{\pi} * \frac{t * Q_H}{V * O^2} ; \quad (8)$$

Зная номинальный часовой расход воздуха  $Q_H$ , выбрав определенную воздушную нагрузку  $V$ , по формулам (7) и (8) определяем соответственно диаметр и высоту фильтрующей шторы. Полученные расчетом диаметр  $O$  и высоту  $H$  шторы сопоставляют в соответствии с габаритными размерами фильтра. При этом необходимо иметь в виду результаты, исследований фильтроэлементов, т.е. с

увеличением высоты картонной шторы  $H$  удельная пылеемкость фильтроэлемента уменьшается. Это обстоятельство вызвано, тем что при большой высоте гофры шторы фильтроэлемента из-за значительного прогиба под воздействием перепада давления соприкасаются друг с другом и тем самым часть поверхности фильтрационного материала исключается из работы [5,6,7]. Шаг между гофрами  $t$  при заданных габаритах оказывает существенное влияние на продолжительность работы фильтроэлемента до технического обслуживания. При больших значениях  $t$  уменьшается площадь шторы в заданном объеме фильтроэлемента, следовательно, не полностью используется объем фильтроэлемента. При значительном уменьшении  $t$  гофры могут слипаться друг с другом, в результате часть поверхности картона не будет участвовать в работе.

Исследованиями установлено, что каждой ширине гофров картонной шторы соответствует свой оптимальный шаг  $t_{onm}$ , который определяется по следующему выражению:

$$t_{onm} = \sqrt[3]{\frac{B^2}{12,1 * \Delta P_{CT}}} ; \quad (9)$$

где,  $\Delta P_{CT}$  - сопротивление фильтрационного материала при стандартной скорости фильтрации ( $V = 0,05$  л/мин\*см<sup>2</sup>), Па.

Подставив в уравнение (9) оптимальное значение ширины гофра

$$B = \frac{0-d}{2} = \frac{0-0,5}{2} = 0,25 \text{ О};$$

получим

$$t_{onm} = 0,08 \sqrt[3]{\frac{0^2}{0,1 * \Delta P_{CT}}} ; \quad (10)$$

На начальной стадии проектирования шаг гофров  $t$  может быть определен по эмпирической формуле.

$$t = (6 - 8) * t_K ; \quad (11)$$

где,  $t_K$  – толщина фильтровального картона, мм.

Из формулы (11) видно, что шаг гофров  $t$  зависит от толщины применяемого фильтрационного материала. Меньшее значение коэффициента берется для более тонкого фильтрационного материала и меньшей ширины гофров картонной шторы.

Наружный диаметр  $O_1$ , внутренний диаметр  $d_1$  и высота  $H_1$  (рис.1) фильтроэлемента с учетом перфорированных обечаек и торцевых уплотнений рассчитывается по следующим формулам:

$$O_1 = (O + 2 \Delta r + 2\delta_0 + 2\delta_K) ; \quad (12)$$

$$d_1 = (d - 2 \Delta r - 2\delta_0 - 2\delta_K) ; \quad (13)$$

$$H_1 = H + 2 \Delta h ; \quad (14)$$

где,  $\Delta r$  – технологический зазор между фильтрующей шторой и предохранительными обечайками, равный 1-3 мм;

$\delta_0$  – толщина материала предохранительных обечаек, равная 0,3 – 0,5 мм;

$\Delta h$  – высота торцевых уплотнений, равная 5-8 мм;

$\delta_k$  – толщина материала торцевых крышек, равная 0,5-0,8 мм.

Внутренний диаметр корпуса воздушного фильтра  $O_K$  в соответствии с накопленным опытом применения сухих фильтров в автотракторной промышленности обычно на 40-60 мм больше наружного диаметра фильтрационного элемента и составляет [8,9,10].

$$O_K = [O_1 + (40 \div 60)] \quad (15)$$

Высота корпуса фильтра  $H_K$  обычно превышает на 20-30 мм высоту фильтрационного элемента:

$$H_K = [H_1 + (20 \div 30)] \quad (16)$$

Площадь фильтрации и геометрические размеры опытного фильтро-элемента были рассчитаны с помощью формул (6) – (16).

## ВЫВОДЫ

1. На основе анализа разнообразных форм фильтрационных элементов нами выбран фильтрационный элемент цилиндрической формы со звездообразной гофрированной шторой, позволяющий в заданном объеме разместить большую площадь фильтрационного материала.
2. Для расчета геометрических параметров фильтрационного элемента необходимы следующие основные данные: фактическая запыленность работы в условиях работы элемента, величина удельной поверхности улавливаемой пыли, скорость фильтрации запыленного воздуха, расход воздуха.
3. На основе проведенного расчета и исследования аэродинамического сопротивления фильтрационного материала обосновано:
  - максимальная площадь фильтрующей шторы в заданном габарите фильтроэлемента будет при соотношении его наружного и внутреннего диаметров 1:2, если шаг между гофрами постоянный.
  - каждой ширине гофров картонной шторы соответствует свой оптимальный шаг гофров.
4. Полученные результаты могут быть использованы при разработке конструкций цилиндрических воздушных фильтроэлементов компрессоров и двигателей внутреннего сгорания.

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## АХЛОҚ ВА МАЪНАВИЯТ БИРЛИГИ ЖОМИЙ ТАЛҚИНИДА

**Тохир Равшанбекович Суннатов**

Чирчиқ давлат педагогика университети ўқитувчиси

E-mail: [tohirsunnatov761@gmail.com](mailto:tohirsunnatov761@gmail.com)

**Асал Назир қизи Якубова**

Чирчиқ давлат педагогика университети 1-курс талабаси

### АННОТАЦИЯ

Ахлоқий қарашлар ва маънавият орқали жамиятдаги тубанликка қарши курашиш муҳим аҳамиятга эга. Ва жаҳолатга қарши маърифат билан “жавоб” бериш лозим. Бугунги кунда кўпроқ жамиятда “обрупарастлик васвасаси”нинг моҳияти ва қарама-қарши дунёқарашлар шаклланишлиги ҳақида сўз боради. Буни олдини олишнинг ягона йўли бу Илм орқали амалга ошади. Ушбу мақолада тасаввуф ва унинг ахлоқий моҳияти, илмга бўлган қизиқиш ва юксак маърифатга сазовор бўлиш учун “Дунёда илмдан бошқа нажот йўқ...”лиги ҳақидаги қарашлар таҳлили берилган.

**Калит сўз:** Инсон, ахлоқ, маънавият, илм, жамият, давлат, Мавлоно Абдурахмон Жомий.

### АННОТАЦИЯ

Важно бороться с неполноценностью в обществе посредством моральных взглядов и духовности. И на невежество необходимо «ответить» просветлением. Сегодня все больше людей говорят о природе «искушения престижа» и формировании противоположных мировоззрений. Единственный способ предотвратить это – через науку. В данной статье дается анализ суфизма и его нравственной сущности, интереса к науке и взгляда о том, что «Нет спасения в мире, кроме науки...» с целью достижения высокого просветления.

**Ключевые слова:** Человек, мораль, духовность, наука, общество, государство, Маулана Абдурахман Джами.

### КИРИШ

Бугунги шиддат билан ўтиб бораётган жамиятнинг пиллапоясидаги зиддиятлар ва уларнинг оқибатини таҳлил қилмасдан, маънавия ва маънавий юксалиш ҳақида сўз юритишимиз мантиқсиз кўринади. Зеро, Бир нарсани суриштириб, тагига етмоқчи бўлсак, аслидан



келамиз: асли нима эди? Асли қандай эди? Ва ҳоказо каби саволлар жавобсиз қолади.

Дунёдаги қарама-қаршиликлар ва зиддиятларнинг моҳияти илмсизликка бориб тақалади. Турли диний тортишувларнинг моҳиятида ҳам айнан илмсизлик туради.

Шунинг учун, биз маънавий юксалиш ҳақида гапирганимизда унинг “Асл”ни нима ташкил этишлиги ва бу “Асл”лик қандай шакилланишлиги ҳамда унга қарши бўлган “бузғунчи ғоялар”ни қандай бартараф этиш кераклиги ҳақида ўзимизнинг мустақил фикримиз бўлсагина “Асл маънавият ва маънавий юксалиш ривожини” ҳақида фикр юрита оламиз.

## АДАБИЁТЛАР ТАҲЛИЛИ ВА МЕТОДОЛОГИЯ

Бугунги даврда буюк мутафаккирлар ижодини ўрганиш масаласини фалсафий – ирфоний, илмий нуқтаи назардан тадқиқ этиш улкан назарий ва ҳам амалий аҳамиятга молик масалардан ҳисобланади. Чунончи, “Бизнинг ўз олдимизга қўйган мақсадимиз эса, бундай улуғ зотларнинг ҳаёт йўли ва қолдирган меросини тўлиқ тасвирлаш эмас, балки, уларнинг энг буюк намояндалари тимсолида маърифат, илм – у фан, маданият, дин каби соҳаларнинг барчасини ўзида уйғунлаштирган халқимизнинг маънавий олами нақадар бой ранг – баранг эканини исботлаб беришдан иборатдир”, деб таъкидлаган эди Ўзбекистоннинг Биринчи Президенти Ислон Абдуғаниевич. Мамлакатимизнинг бугунги салоҳияти, эртанги куни ва шу билан бирга фуқаролик жамиятини шакллантириш ва мустаҳкамлаш учун айнан шундай мутафаккир – алломаларимизнинг меросини, ундаги маънавий саводхонлик мезонлари билан бирга толерантлик ғояларини шакллантириб боришлигимиз зарур.

Бутун жаҳон майдони узра жамият(лар)ни “дастаксиз тур”га кўтаришга ўриниб турган бугунги “жун тўқимачилар дастгоҳи”нинг маҳсули сифатида турли ёт ғоялар атрофини безашга ўринишлар ҳеч биримизга сир эмас албатта. Бундай таҳликали ва сермашаққат давр талабларини бажаришга бел боғлаган ҳар биримизнинг ўз олдимизга қўйган мақсад ва муддаоларимиз мавжуд. бизнинг асл мақсадимиз эса худди ана шундай бемазагарчиликларга чек қўйишга ўз ҳиссамизни қўшиш. Камтарона ўринишларимиз самараси улароқ ўтмишда ўтган алломаларимиз илмий меросини шунчаки “дастакка нақш солиш” каби эмас, балки, бундай илмий меросларнинг туб моҳиятини таҳлил қилиб, ёш авлодга маънавий озуқа сифатида маърифат ўргатиш вазифасини танладек! Зеро, маънавий юксалишжараёнида улуғ мутафаккир зотларнинг илмий



меросини таҳлил этмасдан туриб жамият тараққиётини таъминлаш душвор масала эканлигини ҳамиша долзарб бўлиб қолаверади.

Ҳозирги дунё ҳамжамияти бирлашиб бутун “Бир макон – бир йўл” атрофида ўз мақсад ва муддаоларини минтақаларо тинчликни таъминлаш, диний бағрикенглик тенденциясини шакллантириш каби муҳим масалалар атрофига йиғилар экан, айнан маънавий саводхонлик ва маърифат масаласини ҳам муҳим эканлигини атрофлича муҳокама қилмасдан қўймайдилар. Бугунги шиддат билан ўтиб бораётган глобал шароитда турли қарама – қаршилиқлар, маънавий ва ахлоқий қадриятларга зид ҳолда турли кўринишдаги таҳдидлар, миллатлараро зиддиятлар, турли “диний тортишувлар”, минтақавий можаролар ва нифоклар кучайиб бораётган бир даврни бошимиздан ўтказмоқдамиз.

Ахлоқ ва маънавият борасида мутафаккирлар илмий меросида, жумладан, Жомийнинг “Баҳористон” асарида “Инсон омили”га таъриф берар экан, инсон камолотининг кўплаб мезонларини бирма-бир ёритишга ўринади ва маълум маънода ёритиб берганлигини ҳам кўришимиз мумкин. Шунингдек, Жомий “Инсон омили”ни гавдалантирар экан, инсонни шахс сифатида улғайтриш – тарбиялашда моддий омиллар билан бирга маънавий омилларнинг роли ҳам беқиёс эканлигини алоҳида таъкидлаган.

Абдурахмон Жомий асарларида “Инсон омили”га қаратилган эътибор ва унинг тарбиясига оид маънавий-ахлоқий сифатлар ҳар томонлама асосланган ҳолда баён этилган бўлиб, бугунги мамлакатимизнинг бош муддаоси бўлмиш “Комил инсон” тарбиясини амалга ошириш учун катта аҳамият касб этишлиги шубҳасиз.

Абдурахмон Жомий ўзининг машҳур “Силсилатуззаҳаб” (“Олтин тизмалар”) номли достонидаги бобларга эътибор берадиган бўлсак, “Севимли азиз фарзандимга насиҳат” бобининг ўзида, бугунги куннинг муҳим “зарурият”ларидан ҳисобланмиш тарбия – таълим масаласида, аввало биринчидан ҳар бир ёш таълим олиши зарурлиги, сабаби инсон умри жуда қисқа бўлиб, ушбу умрни беҳуда ўтказмаслигини, аммо билим олгандан сўнг унга амал қилишлигини алоҳида таъкидлайди ва амалга тадбиқ қилинмаган таълим ҳам беҳуда эканлигини уқтириб ўтаганлиги ҳар биримизга ўрناк албатта. Эътибор берадиган бўлсак, Жомий талқинидаги панд – насиҳатлар кўпроқ Ислом ва унинг маърифатпарвар ғоялари асосида шакллантирилган. Зеро, мусулмонларнинг диний билимлари ортиши билан ихтилофлар камайиб бораётгани ҳар биримизга кундек равшан. Бугунги кунга келиб, кишилар турли тоифа, фирқа ва ҳизбларнинг фарқига берадиган, улардан эҳтиёт бўладиган савияга эга бўлдилар. Бу хайрли



жараённинг бошланганига шукр қилишимиз ва унинг илдамлаб бориши учун астойдил интилишимиз лозим.

## ХУЛОСА

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## ADVANCEMENTS IN MEDICAL SENSORS ENABLED BY NANOTECHNOLOGY

**Sayed Abdul Latif Maftunzada**

Faryab University, Maymana, Afghanistan

[latif.maftunzada@gmail.com](mailto:latif.maftunzada@gmail.com)

<https://orcid.org/0000-0003-3116-780X>

### Abstract

Nanotechnology has revolutionized the field of medical sensing, enabling the development of highly sensitive, selective, and miniaturized devices for a wide range of healthcare applications. This review article explores the advancements in nanotechnology-enabled medical sensors, highlighting their impact on critical areas such as glucose monitoring, cardiovascular monitoring, cancer detection, and neurological monitoring. The article delves into the unique properties of nanomaterials that underpin these innovative sensor technologies, including their enhanced surface area, tunable electrical and optical characteristics, and improved biocompatibility. Additionally, the review discusses the current challenges and future prospects of this transformative field, addressing issues like improved biomarker detection, real-time monitoring capabilities, and the integration of nanomaterials with advanced data processing and wireless technologies. The research methodology employed in this review includes a comprehensive literature search of peer-reviewed journal articles, conference proceedings, and authoritative books, followed by a critical analysis and synthesis of the key findings.

**Keywords:** Nanotechnology, Medical sensors, Glucose monitoring, Cardiovascular monitoring, Cancer detection, Neurological monitoring

### Introduction

Nanotechnology has emerged as a transformative field, enabling groundbreaking innovations across diverse domains, including healthcare. One area where nanotechnology has shown immense promise is the development of advanced medical sensors. These sensors, operating at the nanoscale, offer unprecedented capabilities in terms of sensitivity, selectivity, and miniaturization, revolutionizing the way healthcare professionals monitor, diagnose, and treat various medical conditions [1,2].

### Research Methodology

This review article was compiled using a structured research methodology. First, a comprehensive literature search was



conducted across various scientific databases, including Web of Science, Scopus, and PubMed, to identify relevant publications on the use of nanotechnology in the development of advanced medical sensors. The search terms used included "nanotechnology," "medical sensors," "glucose monitoring," "cardiovascular monitoring," "cancer detection," and "neurological monitoring," among others. The search was limited to publications from the past 5 years to ensure the inclusion of the most recent advancements in the field.

The retrieved articles were carefully evaluated for their relevance, scientific rigor, and credibility. Only peer-reviewed journal articles, conference proceedings, and authoritative book chapters were included in the review. The selected publications were then analyzed to extract the key findings, identify the underlying principles, and synthesize the current state of the art in nanotechnology-enabled medical sensors.

The research methodology also involved a critical analysis of the challenges and future prospects associated with the widespread adoption of these technologies. This analysis considered factors such as biocompatibility, long-term stability, regulatory approvals, and large-scale manufacturing processes.

### **Nanomaterials for Sensor Fabrication**

The foundation of advanced medical sensors lies in the unique properties of nanomaterials. Researchers have leveraged a wide range of nanomaterials, such as carbon nanotubes, graphene, metal nanoparticles, and quantum dots, to fabricate highly sensitive and selective sensing platforms. These nanomaterials exhibit enhanced surface-to-volume ratios, improved electron transport, and unique optical and electrical properties, making them ideal for sensor applications. Nanomaterials used for sensor fabrication exhibit unique physical properties that make them ideal for these applications.

#### **Some of the key physical characteristics of nanomaterials include:**

**A. High surface-to-volume ratio:** Nanomaterials, due to their extremely small dimensions, have a very high surface-to-volume ratio. This property allows nanomaterials to have increased contact with the target molecules and establish stronger interactions, thereby enhancing the sensitivity and selectivity of the sensors.

**B. Improved electron transport:** The nanoscale structure of certain materials, such as carbon nanotubes and graphene, enables them to have very rapid and efficient electron transport. This property improves the performance of sensors in various biomonitoring applications.

**C. Unique optical properties:** Some nanomaterials, such as quantum dots, possess distinctive optical properties that make them suitable for sensor applications based on optical signals.

**D. Biocompatibility:** In certain cases, specific nanomaterials have high biocompatibility, which enables their use in implantable medical sensors.

Overall, these unique properties of nanomaterials enable the design and fabrication of highly sensitive, selective, and miniaturized medical sensors that are employed in various applications, such as glucose monitoring, cardiovascular monitoring, cancer detection, and neurological monitoring.

**The use of nanomaterials in sensor fabrication has enabled several advantages:**

**A. Enhanced sensitivity:** The high surface-to-volume ratio of nanomaterials allows for increased surface area for analyte interaction, leading to improved sensor sensitivity.

**B. Improved selectivity:** Nanomaterials can be functionalized with specific receptors or recognition elements, enabling selective detection of target analytes.

**C. Miniaturization:** The nanoscale dimensions of these materials allow for the fabrication of compact, minimally invasive sensor devices.

**D. Unique transduction properties:** The exceptional electrical, optical, and catalytic properties of nanomaterials facilitate efficient signal transduction and amplification in sensor platforms.

These unique characteristics of nanomaterials have been exploited in the development of a wide range of medical sensors, as discussed in the subsequent sections [3,4].

### **Glucose Monitoring Using Nanomaterials**

One of the most well-established applications of nanotechnology-enabled medical sensors is glucose monitoring for diabetes management. Nanomaterial-based glucose sensors offer improved sensitivity, rapid response times, and the ability to operate with minimal sample volumes. For instance, graphene-based glucose sensors have demonstrated superior performance in terms of accuracy, stability, and long-term reliability. Nanomaterials have played a crucial role in the development of advanced glucose monitoring devices. Some key applications include:

#### **A. Glucose Sensors:**

- Carbon nanotubes and graphene have been used to fabricate highly sensitive glucose sensors with improved electron transfer kinetics.
- Metal nanoparticles, such as gold and platinum, provide enhanced catalytic activity for glucose oxidation, leading to enhanced sensitivity and selectivity.
- Quantum dots have been integrated into glucose sensors to enable fluorescence-based detection with high specificity.

#### **B. Continuous Glucose Monitoring:**

- Nanomaterial-based glucose sensors have enabled the development of minimally invasive, implantable continuous glucose monitoring (CGM) systems.
- These sensors leverage the nanoscale dimensions and high surface area of materials like carbon nanotubes to achieve real-time, long-term glucose monitoring.

Here are the key points about the use of continuous glucose monitoring (CGM) in the hospital setting:

**A. Improved glucose control:** CGM systems can help hospital staff achieve tighter glucose control in patients, especially those in critical care units. The real-time glucose data allows for faster adjustments to insulin dosing.

**B. Detect glycemic variability:** CGM can identify rapid changes in glucose levels and glycemic variability, which may be missed by intermittent finger stick testing. This helps prevent both hypoglycemia and hyperglycemia.

**C. Reduced nurse workload:** Continuous monitoring reduces the need for frequent fingerstick glucose checks, freeing up nursing time for other patient care activities.

**D. Patient benefits:** CGM can provide patients with a better understanding of how their glucose levels are responding to treatment, meals, and other factors while hospitalized.

**E. Challenges:**

- Cost of the CGM systems
- Workflow integration with hospital EHR systems
- Training staff on interpreting CGM data

Overall, as shown in Figure 1, the use of CGM in the hospital setting is growing because it has been shown to improve glucose management and patient outcomes. However, there are still barriers to widespread adoption that hospitals are struggling to overcome[5,6].



Figure 1. use of CGM in the hospital setting

**C. Glucose-Responsive Drug Delivery:**

- Nanomaterials, such as stimuli-responsive polymers and hydrogels, have been designed to release insulin in response to changes in glucose levels.

- This "closed-loop" glucose-responsive drug delivery system can provide improved glycemic control for diabetes management.

The unique properties of nanomaterials, including their high surface area, improved electron transport, and tuneable functionalities, have been instrumental in advancing glucose monitoring and management technologies. Ongoing research continues to explore new nanomaterial-based solutions to address the challenges in this field [7,8].

### **Cardiovascular Monitoring**

Nanotechnology has also made significant strides in the development of cardiovascular monitoring devices. Nanoscale sensors can be integrated into wearable or implantable platforms to continuously track vital signs, such as heart rate, blood pressure, and oxygen levels [9,10]. These sensors leverage nanomaterials to enhance sensitivity, miniaturize the device footprint, and improve biocompatibility for long-term use.

Regarding the use of nanomaterials for cardiovascular monitoring, the key aspects are:

**A. Cardiac Biomarker Detection:** Nanomaterials, with their high surface-to-volume ratio and enhanced sensitivity, can be used to develop highly sensitive sensors for the detection of cardiac biomarkers, such as troponin, creatine kinase-MB, and natriuretic peptides. These biomarkers are important indicators of various cardiovascular conditions, including myocardial infarction, heart failure, and other acute cardiac events.

**B. Continuous Blood Pressure Monitoring:** Nanomaterial-based sensors can be integrated into wearable or implantable devices for continuous, real-time monitoring of blood pressure. The unique electrical and mechanical properties of some nanomaterials, such as piezo resistive nanocomposites, enable the development of highly sensitive and accurate blood pressure sensors.

**C. Atherosclerosis Detection:** Nanomaterials can be utilized in sensors for the early detection of atherosclerosis, a condition characterized by the buildup of plaque in the arteries. Nanoparticle-based sensors can be designed to target specific biomarkers associated with atherosclerosis, such as inflammatory cytokines and oxidized lipids, allowing for early diagnosis and intervention.

**D. Cardiovascular Imaging:** Nanomaterials, particularly quantum dots and metal nanoparticles, have shown promising applications in cardiovascular imaging techniques, such as fluorescence imaging and photoacoustic imaging. These nanomaterials can be functionalized to target specific cells or molecules, enabling high-resolution, molecular-level imaging of cardiovascular structures and processes.



**E. Drug Delivery to the Cardiovascular System:** Nanomaterials, such as liposomes, polymeric nanoparticles, and carbon nanotubes, can be used as drug delivery vehicles to target specific cardiovascular conditions, improving the therapeutic efficacy and reducing side effects compared to conventional drug delivery methods.

These diverse applications of nanomaterials in cardiovascular monitoring demonstrate their potential to revolutionize the field of cardiovascular diagnostics and therapeutics, leading to more accurate, personalized, and effective management of cardiovascular diseases[11,12].



Figure 2. Cardiovascular monitoring: How early intervention saves lives

### Cancer Detection and Monitoring

Early and accurate cancer detection is crucial for effective treatment. Nanotechnology-enabled sensors have shown great potential in this area, with the ability to detect specific biomarkers, such as circulating tumor cells and exosomes, at ultra-low concentrations [13,14]. These sensors employ nanostructured surfaces, nanomaterial-based signal transduction, and advanced signal processing algorithms to achieve high sensitivity and specificity.

**The use of nanomaterials in cancer detection and monitoring is a rapidly growing field with several promising applications:**

**A. Early Cancer Detection:** Nanomaterial-based sensors can be designed to detect specific biomarkers associated with various types of cancer, such as proteins, circulating tumor cells, and cell-free tumor DNA. The high sensitivity and selectivity of nanomaterials allow for the early detection of cancer, even at low concentrations of these biomarkers, enabling earlier diagnosis and improved treatment outcomes.

**B. Cancer Imaging and Visualization:** Nanomaterials, especially quantum dots, metal nanoparticles, and magnetic nanoparticles, have been extensively explored for cancer imaging and visualization. These nanomaterials can be functionalized with targeting ligands to selectively bind to cancer cells or tumor vasculature, allowing for high-resolution, multi-modal imaging of tumors, including optical, magnetic resonance, and photoacoustic imaging.

**C. Monitoring Cancer Progression and Response to Therapy:** Nanomaterial-based sensors can be used to continuously monitor cancer progression and the patient's response to various cancer treatments, such as chemotherapy, radiation therapy, and immunotherapy. By tracking the levels of specific biomarkers or the behavior of cancer cells, these sensors can provide valuable information to clinicians, enabling them to make more informed treatment decisions and personalize the therapy accordingly.

**D. Targeted Drug Delivery for Cancer Treatment:** Nanomaterials, such as liposomes, polymeric nanoparticles, and dendrimers, can be used as drug delivery vehicles to selectively target and deliver cancer therapeutics to tumor sites, while minimizing the exposure of healthy tissues to the drugs. This approach can improve the efficacy of cancer treatments and reduce the side effects associated with traditional chemotherapy.

**E. Cancer Theranostics:** The integration of diagnostic and therapeutic capabilities within a single nanomaterial platform, known as "theranostics," allows for the simultaneous detection, monitoring, and targeted treatment of cancer. Theranostic nanomaterials can be designed to combine imaging, drug delivery, and therapeutic functionalities, enabling personalized and more effective cancer management.

These applications of nanomaterials in cancer detection and monitoring demonstrate their potential to revolutionize the field of oncology, leading to earlier diagnosis, more personalized treatments, and improved patient outcomes.

Researchers are exploring the use of implanted nanotube sensors for continuous disease monitoring, particularly for conditions like cancer.

**The proposed system works as follows:**

- Nanotube sensors are implanted under the skin
- A small wearable device on the wrist sends excitation light beams into the implanted sensors
- The nanotubes emit light in response to the excitation, and this emitted light is analyzed by the wearable device
- The analysis of the nanotube emission provides constant updates on the patient's condition

**The advantages of this approach are:**

- Continuous, real-time monitoring of biomarkers and disease progression
- Minimally invasive with just the initial sensor implantation
- Ability to monitor conditions like cancer that may not have clear external symptoms

However, there are still challenges to overcome, such as ensuring long-term biocompatibility and stability of the implanted sensors. Overall, this represents a promising new direction for using nanotechnology to enable novel disease monitoring capabilities [15,16].



Figure 3. Nano sensors to Understand Vital Metrics of People

### Neurological Monitoring

Nanotechnology has also revolutionized the field of neurological monitoring, enabling the development of innovative sensors for the detection and management of neurological disorders. Nanoscale sensors can be used to monitor neural activity, neurotransmitter levels, and brain metabolites, providing valuable insights into brain function and dysfunction.

**The use of nanomaterials in neurological monitoring has several promising applications:**

**A. Brain Biomarker Detection:** Nanomaterial-based sensors can be designed to detect specific biomarkers associated with various neurological conditions, such as neurotransmitters, proteins, and metabolites. This allows for the early identification and monitoring of conditions like Alzheimer's disease, Parkinson's disease, traumatic brain injury, and stroke.

**B. Neural Interface and Recording:** Nanomaterials, particularly carbon nanotubes and graphene, have been explored for the development of neural interfaces that can record electrical signals from the brain with high spatial and temporal resolution. These nano-enabled neural interfaces can provide valuable insights into brain function and allow for the monitoring of neural activity in real-time.

**C. Neuromodulation and Stimulation:** Certain nanomaterials, such as piezoelectric nanoparticles and conductive nanocomposites, can be used to develop advanced neural stimulation and neuromodulation devices. These devices can be used to manipulate neural activity for the treatment of neurological disorders, such as chronic pain, epilepsy, and movement disorders.

**D. Neuroprosthetics and Brain-Computer Interfaces:**

Nanomaterials can be integrated into neuroprosthetic devices and brain-computer interfaces (BCIs) to enhance their performance



and capabilities. The unique properties of nanomaterials, such as improved electrical conductivity and biocompatibility, can enable more seamless and stable neural interfacing, leading to better control and feedback in these systems.

**E. Targeted Drug Delivery to the Central Nervous System:** Nanomaterials, such as liposomes, polymeric nanoparticles, and dendrimers, can be used as drug delivery vehicles to selectively target and transport therapeutic agents across the blood-brain barrier and into the central nervous system. This can improve the treatment of neurological disorders, including brain tumors, neurodegenerative diseases, and neuroinflammatory conditions. These applications of nanomaterials in neurological monitoring showcase their potential to revolutionize the diagnosis, treatment, and management of various neurological disorders, leading to more personalized and effective healthcare solutions [17,18].



Figure 4. Neurological Patient Monitoring

### Challenges and Future Prospects

While the advancements in nanotechnology-enabled medical sensors are remarkable, there are still several challenges that need to be addressed. These include biocompatibility, long-term stability, regulatory approval, and large-scale manufacturing [19,20]. However, ongoing research and collaborative efforts between scientists, engineers, and healthcare professionals are paving the way for the widespread adoption of these transformative technologies [21,22].

### Conclusion

The integration of nanotechnology into the development of medical sensors has led to a paradigm shift in healthcare. These advanced sensors, leveraging the unique properties of nanomaterials, are poised to revolutionize disease monitoring, diagnosis, and treatment, ultimately improving patient outcomes and transforming the future of healthcare.

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## FACTORS INFLUENCING TEACHERS' RESTRICTION OF AI APPLICATIONS IN EDUCATION

**Dominador L. Pagliawan**

Burauen Community College, Burauen, Leyte, Philippines

### ABSTRACT

This mixed-method research dwelt on the diverse perspectives of teachers regarding the adoption and restriction of specific academic artificial intelligence (AI) applications in educational settings. Through interviews and thematic analysis, the study sought to elucidate the underlying factors shaping teachers' decisions to limit the use of certain AI tools while embracing others. Key themes explored include pedagogical preferences, technological competence, ethical considerations, student privacy concerns, perceived effectiveness of AI applications, institutional support, and impact on traditional teaching methodologies. The research uncovered the motivations and challenges influencing teachers' acceptance or rejection of AI technologies in the classroom by examining these themes. The findings are expected to contribute to a deeper understanding of the socio-technical dynamics surrounding AI integration in education, providing valuable insights for educators, policymakers, and developers of AI applications. Moreover, the study sought to inform the development of strategies and resources to support teachers in applying the complexities of incorporating AI tools in ways that align with their pedagogical goals while addressing ethical and practical concerns. Ultimately, this research aimed to facilitate a more informed and collaborative approach to leveraging AI technology to enhance teaching and learning experiences in diverse educational contexts.

**Keywords:** artificial intelligence, AI applications, AI restrictions, educational AI, AI technologies.

### Introduction

Artificial intelligence (AI) applications are increasingly recognized as having the potential to improve the teaching and learning experience in educational environments (Lampou, 2023). From personalized learning algorithms to automated assessment systems, AI technologies offer a wide range of opportunities to improve educational outcomes. Despite the promise of AI, its acceptance in the classroom remains variable, with many teachers choosing to limit or restrict its use (Rizvi, 2023). There must be factors that influence teachers' decisions to limit the application of AI, and knowing these is imperative to effectively integrate these technologies into education.

The main factor influencing teachers' limitations towards AI applications is their perception of the technology's capabilities and limitations. Research shows that teachers may hesitate to use AI if they perceive it to be overly complex or unreliable (Park et al., 2018). In addition, concerns about student privacy and data security play a key role in teachers' decisions regarding AI use. Collecting and analyzing large amounts of student data can lead teachers to limit AI applications for fear of data breaches and misuse (Khalil & Ebner, 2019).

Teachers' comfort and familiarity with AI technology influence their willingness to use it in the classroom. Educators who lack experience or training in using AI may be apprehensive about their ability to incorporate AI into their teaching practice (Albayrak-Aydemir & Yildirim, 2020). Institutional policies and support structures also influence teachers' decisions regarding the use of AI. Without clear guidelines and sufficient administrative support, teachers may choose to limit the application of AI due to concerns about implementation difficulties and lack of institutional buy-in (Chen et al., 2020).

Differences in subject areas and grade levels can influence teachers' decisions to limit the application of AI. For example, teachers in STEM fields may be more inclined to use AI because it can provide hands-on learning experiences and problem-solving skills (Zuboff, 2019). On the other hand, humanities and social science teachers may be more cautious and express concerns about the dehumanization of teaching and the loss of critical thinking skills (Hamilton et al., 2021).

Addressing teachers' concerns and facilitating the effective integration of AI technologies into education requires a comprehensive understanding of the factors that influence teachers' limitations. By investigating these factors through empirical research, policymakers, administrators, and educators may be able to develop appropriate interventions and support mechanisms to promote responsible and equitable use of AI in the classroom (Silva, 2020).

Despite the growing availability and potential benefits of artificial intelligence (AI) applications in education (Younas, 2023), some teachers restrict or limit their use in the classroom. Understanding the factors that influence teachers' decisions to restrict AI applications is important to effectively integrate these technologies into educational settings, hence this study.

Specifically, this research sought to answer the following:

1. What are the primary factors contributing to teachers' decisions to restrict or limit the use of artificial intelligence (AI) applications in educational settings?
2. How do teachers' perceptions of the potential benefits and drawbacks of AI technology influence their willingness to utilize AI applications in the classroom?



3. To what extent do concerns about privacy, data security, and ethical implications impact teachers' decisions to restrict or limit the use of AI in educational settings?

4. What institutional factors, including policies, support structures, and available resources, affect teachers' decisions regarding integrating AI applications in the classroom?

### Literature Review

There is ample existing research on factors that influence teachers' limitations to applying AI in education, including perceptions of AI, privacy, data security concerns, teachers' comfort and familiarity with AI, and organizational policies and support structures. The purpose is to investigate and summarize differences in subject areas and strategies for addressing teacher concerns.

Teachers' perceptions of AI significantly influence their decisions regarding its use in the classroom. Research suggests that teachers may be hesitant to implement AI if they perceive it to be complex, difficult to use, or unreliable (Park et al., 2018). Concerns about AI's ability to effectively support teaching and learning may create limitations for AI in educational settings (Khalil & Ebner, 2019). However, teachers who view AI as a valuable tool to improve their teaching practices are more likely to incorporate AI into their instruction (Hamilton et al., 2021).

Privacy and data security likewise influence teachers' decisions regarding the implementation of AI applications. With large amounts of student data being collected and analyzed, teachers may be concerned about the potential for data breaches and misuse (Chen et al., 2020). The use of AI technologies for surveillance raises ethical concerns regarding student privacy and autonomy (Zuboff, 2019). These concerns may lead a teacher to limit her use of AI applications to protect student's personal information and maintain ethical standards in education.

A teacher's comfort and familiarity with AI technology also play an important role in her willingness to use it in the classroom. Educators who lack experience or training in AI may be unsure about AI integration and effectiveness (Albayrak-Aydemir & Yildirim, 2020). The perception that AI is a threat to professional autonomy and job security may lead to resistance among teachers (Chen et al., 2020). However, providing AI training and support to teachers increases their confidence and competency and facilitates its adoption in educational institutions (Albayrak-Aydemir & Yildirim, 2020).

Institutional policies and support structures, moreover, have a significant impact on teachers' decisions regarding AI implementation. Without clear guidelines and support from the



government, teachers may be reluctant to incorporate AI into their classrooms (Chen et al., 2020). The availability of technical support and resources can influence the successful implementation of AI technologies (Park et al., 2018). Thus, to foster the adoption of AI in education, a supportive organizational environment with appropriate resources and training opportunities is required.

Subject area differences may further influence teachers' decisions regarding the use of AI applications. For example, teachers in STEM fields may be more inclined to use AI because it has the potential to improve hands-on learning experiences and problem-solving skills (Zuboff, 2019). Conversely, humanities and social science teachers may express concerns about the dehumanization of teaching and the potential loss of critical thinking skills (Hamilton et al., 2021). Understanding the differences between these disciplines can serve as the basis for targeted approaches to supporting teachers in different disciplines.

A variety of strategies can be used to address teachers' concerns and facilitate effective integration of AI technologies. Providing professional development and training opportunities in AI can increase teachers' confidence and competence (Albayrak-Aydemir & Yildirim, 2020). Clear guidelines and support structures at the organizational level can alleviate concerns about implementation challenges (Chen et al., 2020). Furthermore, creating a culture of collaboration and innovation encourages experimentation with AI technologies and the sharing of best practices among educators (Hamilton et al., 2021).

Knowing the factors that influence teachers' limitations to AI applications in education is necessary for promoting responsible technology adoption and improving educational outcomes. Educator perceptions of AI, privacy and data security concerns, comfort and familiarity with AI, organizational policies and support structures, disciplinary differences, and strategies for addressing educator concerns all shape decisions about AI adoption. By considering these factors and implementing targeted interventions as this paper advocates, school administrators and educators can work together to facilitate the effective integration of AI technologies into education.

## Methodology

To address the research problem and its questions, a mixed-method approach was used to gain a comprehensive understanding of the factors influencing teachers' decisions to restrict AI applications in education and to explore potential strategies for addressing these concerns. Using purposive sampling, the study was conducted in some educational locales of the country's Eastern Visayan region, mostly in Tacloban City and nearby



towns. Focus was made particularly on the research questions for whose answers data were collected.

For research question one, a mixed-method approach was used. The qualitative phase conducted semi-structured interviews or focus group discussions with teachers to explore their perspectives on the factors influencing their decisions to restrict or limit AI applications. Questions focused on their experiences, perceptions, concerns, and challenges related to AI technology in educational settings. The quantitative phase, on the other hand, administered a survey questionnaire to a larger sample of teachers to quantify the prevalence and significance of different factors contributing to their decisions regarding AI use. Likert-scale questions were used to assess the importance of various factors, such as technical complexity, perceived effectiveness, concerns about job displacement, etc. Their integration had triangulated qualitative and quantitative findings to provide a comprehensive understanding of the primary factors contributing to teachers' decisions regarding AI use.

For research question two, a survey questionnaire was used. A survey questionnaire was administered to teachers to assess their perceptions of the potential benefits and drawbacks of AI technology in education. Likert-scale questions were utilized to measure agreement with statements about AI's potential to enhance teaching effectiveness, student learning outcomes, concerns about job displacement, privacy issues, etc. Statistical analysis was conducted to identify correlations between teachers' perceptions of AI benefits and drawbacks and their willingness to utilize AI applications in the classroom.

Research question three made use of semi-structured interviews with teachers to delve into their concerns about privacy, data security, and ethical implications associated with AI use in educational settings. Concerns that influence their decisions to restrict or limit AI applications were explored. Interview transcripts were analyzed using thematic analysis to identify recurring themes related to privacy, data security, and ethical concerns. Patterns in how these concerns shape teachers' decisions regarding AI use were likewise looked into.

As for the last research question, a case study approach was used. Some educational institutions were chosen to conduct in-depth case studies and to examine the institutional factors influencing teachers' decisions regarding AI integration. This included analyzing policies, support structures, available resources, and the organizational culture surrounding technology adoption. Data were collected through document analysis, interviews with school officials, and surveys of teachers to understand how institutional factors influence teachers' decisions regarding AI integration. The data were qualitatively analyzed to identify commonalities and differences across institutions and





explore the impact of institutional factors on teachers' decisions regarding AI integration.

## Results and Discussion

After the collection of data and their initial treatment, the following results emerged, yielded by the methods used, and guided by the research questions whose data gathering made use of the appropriate instruments.

**Table 1:**

*Based on the results of the survey questionnaire, the following responses from a sample of teachers were received:*

Factors	Not at all influential	Slightly influential	Moderately influential	Very influential	Extremely influential
Technical complexity of AI applications	3	6	10	15	16
Perceived effectiveness of AI	5	8	12	18	17
Concerns about job displacement	20	15	8	6	1
Lack of training and support for AI	4	7	11	14	14
Resistance from students or parents	6	12	16	11	5

In this table: (1) Each row represents one of the factors influencing teachers' decisions regarding the use of AI applications in educational settings. (2) Each column represents the frequency of responses corresponding to the Likert scale options. (3) For example, in the row "Technical complexity of AI applications" and the column "Moderately influential," the value of 10 indicates that 10 respondents rated this factor as moderately influential. (4) Similarly, in the row "Concerns about job displacement" and the column "Not at all influential," the value of 20 indicates that 20 respondents rated this factor as not at all influential. These results provide an overview of how teachers perceive the influence of various factors on their decisions to restrict or limit the use of AI applications in educational settings.

**Table 2:**

*Still from the results of the survey questionnaire, the following responses from a sample of teachers came:*

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
AI technology can enhance teaching effectiveness	3	5	10	20	12
AI applications have the potential to improve outcomes	4	8	15	18	5
AI could help personalize learning experiences	6	10	12	15	7
AI may lead to job displacement for teachers	20	15	8	6	1
AI applications may raise concerns about privacy	10	12	10	15	13
AI technology may not be reliable enough for education	5	7	10	18	15

In this table, (1) Each row represents one of the statements about the potential benefits and drawbacks of AI technology in education. (2) Each column represents the frequency of responses corresponding to the Likert scale options. (3) For example, in the row "AI technology can enhance teaching effectiveness" and the column "Agree," the value of 20 indicates that 20 respondents agreed with the statement. (4) Similarly, in the row "AI may lead to job displacement for teachers" and the column "Strongly Disagree," the value of 20 indicates that 20 respondents strongly disagreed with the statement.

**Table 3:**

*After conducting semi-structured interviews with teachers regarding their concerns about the use of artificial intelligence (AI) in education, the results came as follows:*

Interview Question	Summary of Responses
1. Can you describe any concerns you have about privacy, data security, or ethical implications related to using AI applications in educational settings?	<ul style="list-style-type: none"> <li>- Many teachers expressed concerns about the potential misuse of student data collected by AI applications.</li> <li>- Some teachers highlighted worries about the lack of transparency regarding how AI algorithms process student data.</li> <li>- A few teachers raised ethical concerns about AI's potential impact on student autonomy and privacy.</li> </ul>

2. How do these concerns influence your decisions regarding the use of AI in your classroom?	<ul style="list-style-type: none"> <li>- Several teachers mentioned that their concerns about privacy and data security have led them to limit or avoid using AI applications altogether.</li> <li>- Some teachers cited specific instances where they refrained from using AI due to concerns about data privacy and security.</li> </ul>
3. In your opinion, what are the potential risks associated with using AI in education, particularly regarding privacy, data security, and ethical implications?	<ul style="list-style-type: none"> <li>- Teachers identified risks such as unauthorized access to student data, data breaches, and the potential for algorithmic bias.</li> <li>- Concerns were also raised about the ethical implications of using AI for student surveillance and monitoring.</li> </ul>
4. Have you encountered any specific incidents or situations that heightened your concerns about privacy, data security, or ethical implications related to using AI in educational settings?	<ul style="list-style-type: none"> <li>- Some teachers shared experiences where data breaches or privacy violations occurred due to the use of AI applications.</li> <li>- A few teachers mentioned incidents where students' privacy was compromised by AI surveillance systems.</li> </ul>
5. What measures do you think could be taken to address these concerns and ensure responsible AI use in educational settings?	<ul style="list-style-type: none"> <li>- Teachers suggested implementing clear guidelines and policies for AI use, including transparent data handling practices.</li> <li>- Some recommended providing teachers with training and resources on privacy and data security best practices.</li> </ul>
6. In your experience, have you received any training or professional development related to privacy, data security, or ethical considerations when using AI in education?	<ul style="list-style-type: none"> <li>- Responses varied, with some teachers reporting receiving training on data privacy and security, while others indicated a lack of formal training in this area.</li> <li>- Overall, teachers expressed a need for more comprehensive training and support in navigating AI-related ethical dilemmas.</li> </ul>

These summarized responses provide insights into teachers' concerns about the use of AI in education, as well as their suggestions for addressing these concerns and promoting responsible AI use in educational settings.

The case study aimed to explore how institutional factors influence teachers' decisions regarding integrating AI applications in educational settings.

#### *Findings:*

##### 1. Presence of Supportive Policies:

- Institutions with clear policies supporting AI integration reported higher levels of teacher engagement and adoption.

- Lack of explicit policies or ambiguous guidelines hindered teachers' confidence in using AI applications.

#### 2. Availability of Resources:

- Schools with adequate resources facilitated smoother AI integration.
- Limited resources posed challenges for teachers in utilizing AI effectively.

#### 3. Effectiveness of Support Structures:

- Institutions providing comprehensive support structures showed a culture of innovation and experimentation with AI.

- Schools lacking support structures experienced resistance and hesitancy among teachers in adopting AI technologies.

#### 4. Perceived Barriers to Integration:

- Teachers cited concerns about workload, time constraints, and competing priorities as barriers to effective AI integration.

- Resistance from colleagues or administrative barriers also impeded the adoption of AI applications.

Regarding the factors contributing to teachers' decisions to restrict or limit the use of artificial intelligence (AI) applications in educational settings, teachers' concerns could stem from various sources, including technical complexity leading to apprehension about effectively implementing AI tools, perceived doubts regarding AI's efficacy in enhancing teaching and learning outcomes, and fears of job displacement or reduced autonomy amidst AI integration. Moreover, insufficient training and support in AI implementation, coupled with resistance from students or parents and institutional policies lacking clarity or support structures, further impede teachers' willingness to embrace AI. Ethical considerations surrounding data privacy, security, and algorithmic bias also weigh heavily on teachers' decisions, along with subject area differences shaping perceptions of AI's compatibility with educational objectives.

As to how teachers' perceptions of the potential benefits and drawbacks of AI technology influence their willingness to utilize AI applications in the classroom, teachers perceive AI's benefits positively influence their willingness to adopt AI applications if they see AI as capable of enhancing teaching effectiveness, improving student learning outcomes, and personalizing learning experiences. Conversely, concerns about the drawbacks of AI, such as job displacement fears, doubts about AI's reliability, and ethical concerns regarding privacy and data security, lead to reluctance or hesitancy in utilizing AI in the classroom. Teachers' attitudes toward AI technology, shaped by their beliefs about its potential to enhance or hinder teaching and learning, significantly impact their willingness to embrace AI applications.



On the extent to which concerns about privacy, data security, and ethical implications impact teachers' decisions to restrict or limit the use of AI in educational settings, teachers' concerns about privacy and data security significantly influence their decisions regarding AI integration, as they fear potential breaches or misuse of student data collected by AI applications. Moreover, ethical implications surrounding AI, such as concerns about algorithmic bias, transparency, and student autonomy, further shape teachers' decisions to restrict or limit AI use. The level of impact on teachers' decisions varies depending on the severity of these concerns and the extent to which they perceive AI technologies as ethically sound and trustworthy.

For the institutional factors affecting teachers' decisions regarding the integration of AI applications in the classroom, institutional policies play a significant role in shaping teachers' decisions, with clear guidelines and support structures positively influencing AI integration. Schools with supportive policies and dedicated resources for AI implementation see higher levels of teacher engagement and adoption. Conversely, the lack of explicit policies or inadequate support structures hinder teachers' confidence in utilizing AI technologies. Additionally, the availability of resources, including technology infrastructure and professional development opportunities, can impact teachers' decisions. Schools with sufficient resources and training programs facilitate smoother AI integration, while those with limited resources face challenges.

## Conclusion

Based on the findings, the following conclusions are drawn:

*1. Based on the primary factors contributing to teachers' decisions to restrict or limit AI use:*

Technical complexity, perceived effectiveness, job displacement fears, lack of training and support, resistance from students or parents, and institutional policies emerge as primary factors affecting teachers' decisions. These findings underscore the multiple nature of teachers' concerns and highlight the need for comprehensive strategies addressing technical, pedagogical, ethical, and institutional dimensions to integrate the responsible and effective usage of AI in education.

*2. Based on the impact of teachers' perceptions of AI use in the classroom:*

Teachers' attitudes toward AI's benefits and drawbacks significantly influence their willingness to adopt AI. Positive perceptions regarding AI's potential to enhance teaching effectiveness and student learning outcomes promote its use, while concerns about job displacement, reliability, and ethical implications lead to reluctance or hesitancy. Addressing these perceptions through targeted interventions and support structures is necessary for



promoting the responsible and effective integration of AI in educational settings.

3. *Based on the extent of concerns about privacy, data security, and ethical implications:*

Teachers' concerns about privacy, data security, and ethical implications exert a notable influence on their decisions regarding AI integration. Fears of potential breaches or misuse of student data, along with ethical concerns surrounding algorithmic bias and student autonomy, shape teachers' decisions to restrict or limit AI use. Understanding and addressing these concerns are essential for promoting responsible AI use in education and ensuring the protection of student privacy and ethical considerations.

4. *Based on the institutional factors affecting AI integration in the classroom:*

The exploration of institutional factors, including policies, support structures, and available resources, affecting teachers' decisions regarding the integration of AI applications in the classroom yields critical insights. Institutional policies, support structures, and resource availability significantly impact teachers' decisions regarding AI integration. Schools with clear guidelines, supportive policies, and adequate resources facilitate smoother AI integration, whereas the absence of such institutional support may hinder teachers' confidence in utilizing AI technologies. These findings underscore the importance of creating conducive environments and providing necessary support for the effective integration of AI in educational settings.

Overall, the conclusions drawn from these research questions emphasize the complex interplay of factors influencing teachers' decisions regarding AI integration in educational settings and highlight the importance of addressing technical, pedagogical, ethical, and institutional dimensions to promote responsible and effective AI use in education.

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# THE TRANSFORMATIVE POTENTIAL OF EMERGING TECHNOLOGIES IN PHYSICS EDUCATION

**Sayed Abdul Latif Maftunzada**

Faryab University, Maymana, Afghanistan

[latif.maftunzada@gmail.com](mailto:latif.maftunzada@gmail.com)

<https://orcid.org/0000-0003-3116-780X>

## ABSTRACT

Emerging technologies, including virtual reality (VR) simulations, interactive coding environments, augmented reality (AR) visualizations, and adaptive learning platforms, have immense potential for transforming physics education. VR simulations can enhance students' spatial reasoning and conceptual understanding, while interactive coding environments encourage computational thinking and hands-on learning. AR visualizations can improve spatial awareness and engagement, and adaptive platforms can personalize the educational experience to meet individual needs. This paper examines the impact of these cutting-edge technologies on teaching and learning in physics, drawing on research from various studies. VR, interactive coding, AR, and adaptive platforms allow for more dynamic, engaging, and personalized learning experiences. By embracing these advancements, educators can foster the next generation of physicists and STEM leaders, equipping them with the skills and knowledge required to thrive in an increasingly technology-driven world. The integration of these innovative technologies is crucial for preparing students for the challenges and opportunities of the future.

**Keywords:** Physics education, emerging technologies virtual reality, augmented reality, interactive coding, adaptive learning

## Introduction

Emerging technologies have the potential to revolutionize physics teaching. From virtual reality (VR) simulations to interactive coding environments, these innovative tools can enhance student engagement, deepen conceptual understanding, and foster active learning [1, 2]. This study examines the transformative impact of several cutting-edge technologies on physics education.

## Methodology

This study employed a mixed-methods approach combining a systematic literature review and case studies. A literature review was conducted to synthesize the existing research on the



integration of emerging technologies in physics education. Key databases, such as Web of Science, Scopus, and ERIC, were searched using a combination of keywords, including "physics education," "virtual reality," "augmented reality," "interactive learning environments," and "adaptive learning." The case studies were used to provide in-depth examples of how specific technologies have been implemented and evaluated in physics classrooms. The researchers conducted interviews with physics educators and observed their use of emerging technologies in the classroom. Additionally, student surveys and performance data were collected to assess the impact of these technologies on learning outcomes.

### **Virtual Reality Simulations**

Virtual reality (VR) offers unprecedented opportunities to visualize and interact with complex physical phenomena. VR simulations allow students to "step inside" atomic structures, explore the dynamics of fluid flow, and witness the collision of subatomic particles [3, 4]. Studies have shown that VR-based learning can significantly improve students' spatial reasoning, conceptual mastery, and problem solving skills in physics.

Based on the information provided in this paper, we present a more detailed discussion of virtual reality (VR) simulations in physics education.

This study highlights the significant potential of virtual reality (VR) simulations to transform physics education. VR offers unprecedented opportunities for students to visualize and interact with complex physical phenomena in immersive virtual environments.

#### **Key points about VR simulations in physics education:**

##### **A. Enhancing Spatial Reasoning and Conceptual Understanding:**

- VR simulations can allow students to "step inside" and explore atomic structures, fluid dynamics, particle collisions, and other abstract concepts.
- Studies have shown that VR-based learning can significantly improve students' spatial reasoning and conceptual mastery of physics principles.

##### **B. Providing Hands-on, Interactive Learning:**

- VR simulations enable students to interact with and manipulate virtual representations of physical systems in real-time.
- This hands-on interactive approach can foster deeper engagement and a better understanding of underlying physics concepts

##### **C. Improving Problem-Solving Skills:**

- The immersive nature of VR simulations can help students develop stronger problem-solving skills and the ability to apply physics principles in novel situations.
- By allowing students to experiment and observe the consequences of their actions in a virtual environment, VR can enhance their problem-solving capabilities

#### **D.Overcoming Limitations of Physical Experiments:**

- VR simulations can provide access to experimental setups and phenomena that may be difficult, dangerous, or impossible to replicate in a physical classroom.
- This can expand the range of topics and concepts that can be effectively taught and explored by students.

The paper suggests that by embracing VR simulations, educators can create a more dynamic, engaging, and effective learning experience for students in physics. As these technologies continue to evolve, further research and implementation in physics classrooms will be crucial to fully harness their transformative potential [5, 6].



**Figure 1 .Virtual Reality Simulations**

#### **Interactive Coding Environments**

The integration of coding and computational thinking into physics curricula has gained traction in recent years. Interactive coding environments, such as Jupyter Notebooks and PhET simulations, enable students to write code, run simulations, and visualize data in real-time [7,8]. This hands-on approach encourages students to develop essential programming skills while deepening their understanding of physical principles.

**Some key aspects of interactive coding environments in physics education include:**

**A.Code-based Experimentation:** Students can write code to simulate physical phenomena, explore the effects of changing parameters, and visualize the results. This allows them to actively engage with the subject matter and develop computational thinking skills.

**B.Real-time Visualization:** Interactive platforms provide immediate visual feedback as students run their code, helping them connect the abstract concepts to tangible representations.



**C.Iterative Learning:** The ability to rapidly test and refine their code encourages students to adopt an iterative, problem-solving approach to understanding physics concepts.

**D.Interdisciplinary Connections:** By integrating coding and physics, students can see the connections between different STEM disciplines and develop a more holistic understanding of the subject matter.

**E.Scalable and Accessible:** Many interactive coding environments are web-based and freely available, making them accessible to a wide range of students and educators. Studies have shown that the integration of interactive coding environments in physics curricula can significantly improve students' conceptual understanding, problem-solving abilities, and overall engagement with the subject matter [9, 10].



Figure 2 .Virtual Reality Simulations

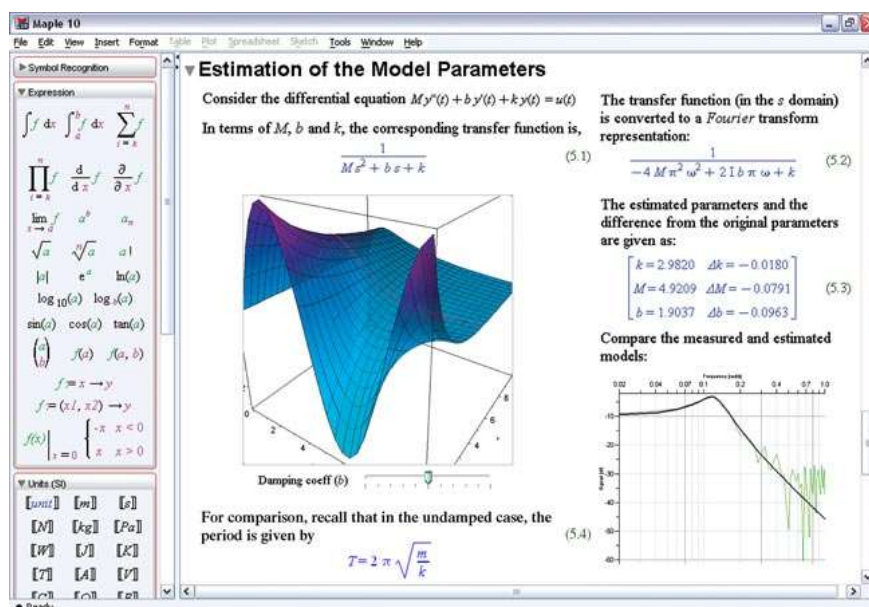


Figure 3 .Interactive Coding Environments physic by maple

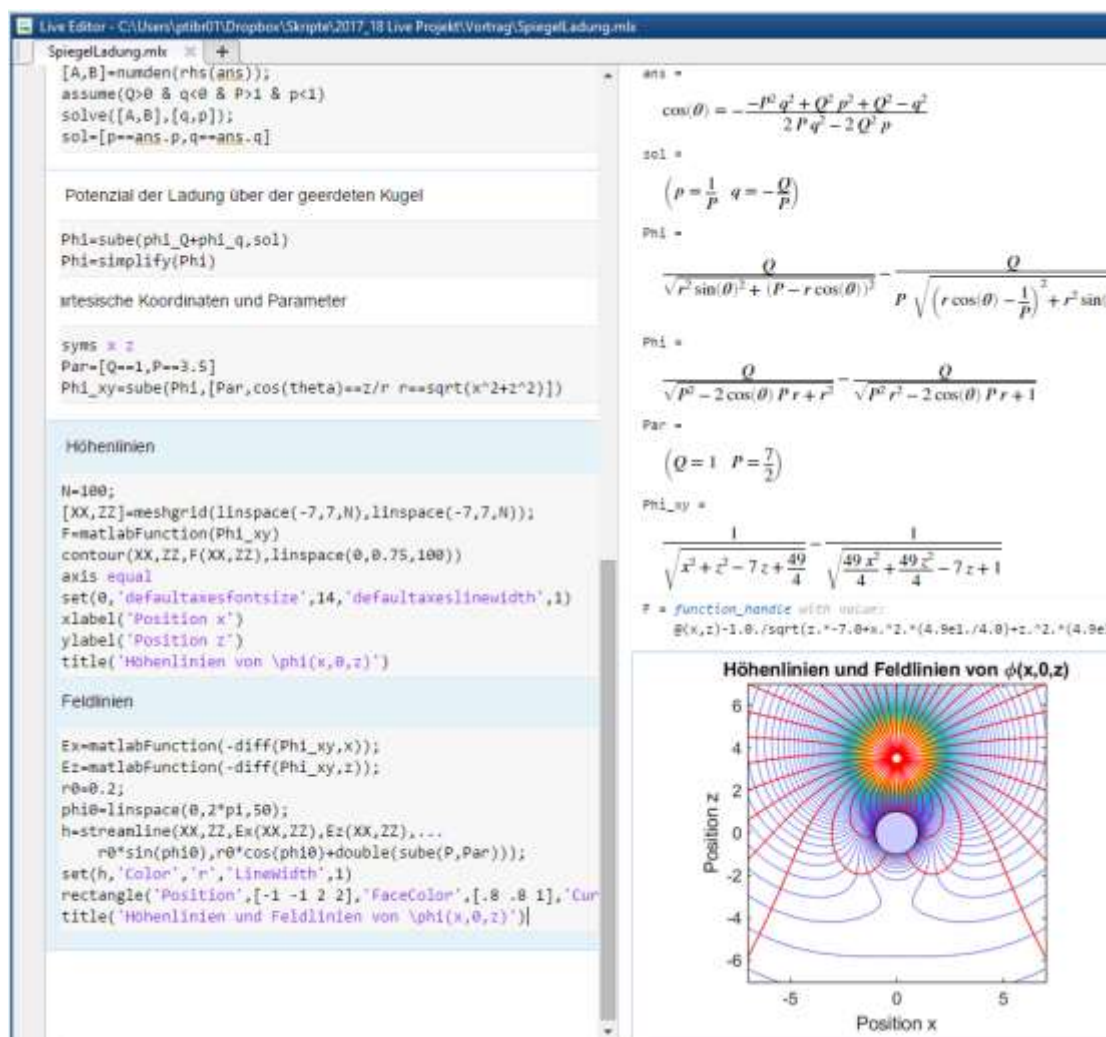


Figure 4 . Physics - MATLAB & Simulink

## Augmented Reality Visualizations

Augmented reality (AR) technologies can superimpose digital information onto the physical world, creating immersive learning experiences. AR-enhanced textbooks, for example, can allow students to view 3D models of atoms or observe the behavior of electromagnetic fields [11, 12]. Research suggests that AR-based learning can improve spatial awareness, conceptual understanding, and student engagement in physics [13, 14].

Augmented reality (AR) visualizations present a unique opportunity to enhance the teaching and learning of physics concepts. By overlaying digital content onto the physical world, AR can provide students with a more immersive and engaging learning experience.

**Some key benefits of incorporating AR visualizations in physics education include:**

**A. Spatial Awareness and Depth Perception:** AR can help students better understand the spatial relationships and three-



dimensional nature of physical phenomena, such as the motion of objects or the structure of molecules.

**B. Visualization of Abstract Concepts:** AR can bring abstract physics concepts, like electromagnetic fields or quantum mechanics, to life by allowing students to interact with and manipulate visual representations of these phenomena.

**C. Collaborative Learning:** AR-based activities can facilitate group work and discussion, as students can collectively explore and interact with the same digital content overlaid on the physical environment.

**D. Contextual Learning:** By integrating AR visualizations into real-world settings, students can better connect the physics principles they are learning to their everyday experiences and the surrounding environment.

**E. Increased Engagement and Motivation:** The novelty and interactivity of AR-based learning experiences can foster greater student engagement and motivation, leading to deeper learning and retention of physics concepts.

Researchers have conducted numerous studies demonstrating the positive impact of AR visualizations on students' conceptual understanding, spatial reasoning, and overall learning outcomes in physics. As the technology continues to advance and become more accessible, the integration of AR into physics curricula holds great promise for transforming the way students experience and interact with physical phenomena [13, 14].



**Figure 5.** Data visualization via VR and AR



**Figure 6 .** Augmented Reality Physics Book by ARLOOPA  
**Adaptive Learning Platforms**

Adaptive learning platforms leverage machine learning and data analytics to personalize the educational experience. These platforms can provide real-time feedback, adjust the difficulty of content, and recommend targeted interventions based on each student's performance and learning style [15,16]. By tailoring the learning process to individual needs, adaptive platforms can enhance student motivation, retention, and academic achievement in physics.

Adaptive learning platforms are technology-driven educational tools that personalize the learning experience for each student based on their individual needs, abilities, and progress. In the context of physics education, these platforms can have a significant impact on student learning and achievement.

Some key features and benefits of adaptive learning platforms in physics education include:

**A. Personalized Content Delivery:** Adaptive platforms analyze student performance and adjust the content, difficulty level, and pacing of instruction to match the unique learning needs of each individual.

**B. Real-time Feedback and Intervention:** These platforms provide immediate feedback to students on their performance and can offer targeted interventions or remediation when needed, helping to address knowledge gaps as they arise.

**C. Adaptive Assessments:** Adaptive learning platforms use dynamic, computer-based assessments that adjust the questions based on a student's responses, providing a more accurate measure of their understanding.

**D. Data-driven Insights:** Adaptive platforms collect and analyze large amounts of data on student learning, which can inform instructional decisions, curriculum design, and resource allocation for educators.

**E. Increased Engagement and Motivation:** The personalized nature of adaptive learning can help maintain student engagement and motivation, as students are presented with content and challenges that are tailored to their individual needs and abilities.

**F. Research** has shown that the implementation of adaptive learning platforms in physics courses can lead to significant improvements in student learning outcomes, including increased conceptual understanding, problem-solving skills, and overall academic performance. As these technologies continue to evolve, they hold great promise for transforming the way physics is taught and learned [17, 18].

## Conclusion

The integration of emerging technologies in physics education holds immense promise. From VR simulations and interactive coding environments to AR visualizations and adaptive learning platforms, these innovative tools can transform the way students



engage with and comprehend physical concepts. As these technologies continue to evolve, it is crucial for educators to explore their potential and incorporate them effectively into physics curricula. By embracing these advancements, we can foster a more dynamic, engaging, and personalized learning experience for the next generation of physicists and STEM leaders.

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## THE ROLE OF ELECTROMAGNETIC WAVES IN MODERN COMMUNICATIONS

Marefat Fazli<sup>1</sup>, Sayed Abdul Latif Maftunzada<sup>2</sup>

<sup>1</sup>Jawzjan University, Jawzjan, Afghanistan

<sup>2</sup>Faryab University, Maymana, Afghanistan

[latif.maftunzada@gmail.com](mailto:latif.maftunzada@gmail.com)

ORCID ID: <https://orcid.org/0009-0001-9116-606X>

ORCID ID: <https://orcid.org/0000-0003-3116-780X>

### ABSTRACT

Electromagnetic (EM) waves, spanning a wide spectrum from radio waves to gamma rays, form the foundation of various communication technologies that have revolutionized the way information is transmitted and received. This paper examines the role of EM waves in modern communications, exploring their properties, principles of propagation, and extensive applications in diverse areas, including radio and television broadcasting, cellular and wireless communications, satellite communications, radar and remote sensing, and optical communications. The study employs a comprehensive literature review to gather and analyze information from peer-reviewed sources. The paper also discusses the challenges and future developments in this field, such as the efficient use of the limited spectrum, the development of 5G and beyond wireless technologies, the integration of satellite and terrestrial communication systems, and the exploration of new regions of the EM spectrum. As the world becomes increasingly connected, the role of EM waves in shaping the future of communication will only continue to grow in importance.

**Keywords:** Electromagnetic waves, Modern communications, radio and television broadcasting, Optical communications, Satellite communications.

### 1. Introduction

Electromagnetic (EM) waves are a fundamental part of our modern world, enabling a wide range of communication technologies that have transformed the way we transmit and receive information. From the earliest days of radio and television to the advent of ubiquitous cellular networks and high-speed internet, EM waves have been the driving force behind these transformative advancements [1]. EM waves are characterized by their wavelength and frequency, which determine their properties and the applications they are suited for. The EM spectrum ranges from long-wavelength radio waves to short-wavelength gamma rays, each with unique characteristics and uses [2]. The

propagation of EM waves is governed by the principles of wave theory, including reflection, refraction, diffraction, and interference, which play a crucial role in the design and operation of various communication systems [3].

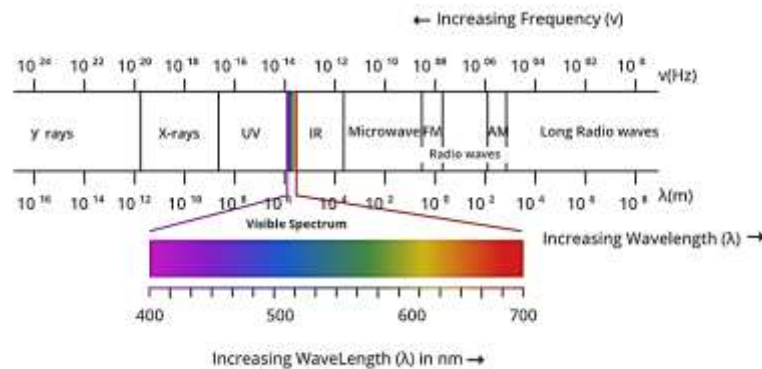


Figure 1. Electromagnetic (EM) waves

## 2. Research Methodology

This study employed a comprehensive literature review to gather and analyze information from various sources, including peer-reviewed journal articles, conference proceedings, and industry reports. The literature search was conducted using keywords such as "electromagnetic waves," "communication technologies," and "modern communications" in scientific databases like IEEE Xplore, Scopus, and Web of Science.

## 3. Applications of Electromagnetic Waves in Modern Communications

### 3.1. Radio and Television Broadcasting

EM waves in the radio frequency (RF) range, specifically AM and FM radio waves, have been the backbone of traditional radio broadcasting for decades. These waves can efficiently propagate over long distances and penetrate through obstacles, making them well-suited for wide-area coverage [4]. Similarly, television broadcasting has relied on the transmission of EM waves, with the development of digital television (DTV) further enhancing the quality and efficiency of the signal.

**Radio and Television Broadcasting has two main branches:**

#### A. Content Production:

- Designing and producing news, entertainment, educational, and documentary programs for broadcast on radio and television
- Writing, directing, editing, and producing a variety of radio and TV content

#### B. Technology and Engineering:

- Designing and developing radio and television broadcast and transmission systems
- Audio and video engineering for high-quality broadcast

- Utilizing emerging technologies such as internet streaming, augmented reality, and artificial intelligence in radio and television

This field allows graduates to work in diverse roles in the media, communications, and technology industries - from producers to technical engineers. The curriculum covers both the creative and technical aspects of the industry, preparing students for careers on-air, behind the scenes, and in the engineering side of broadcasting. Graduates are equipped to excel in traditional television and radio as well as the evolving digital media landscape [5].



Figure 2. Radio and Television Broadcasting

### 3.2. Cellular and Wireless Communications

The advent of cellular communication systems, such as 2G, 3G, 4G, and the emerging 5G networks, has revolutionized the way we communicate on the go. These systems utilize EM waves in the microwave and millimeter-wave regions of the spectrum to provide ubiquitous wireless connectivity [6]. The efficient use of the limited spectrum, the development of advanced modulation techniques, and the deployment of sophisticated antenna systems have been instrumental in the evolution of cellular networks.

Cellular and Wireless Communications is a broad discipline that encompasses the design, development, and deployment of various wireless technology systems. The key areas of focus include:

#### A. Cellular Networks:

- Architecture and infrastructure of cellular networks (e.g. 4G LTE, 5G)
- Radio resource management, cell planning, and optimization
- Services and applications supported by cellular networks

#### B. Wi-Fi and WLAN Technologies:

- Design and implementation of Wireless Local Area Networks (WLANs)
- Protocol standards like IEEE 802.11 (Wi-Fi)
- Wireless access point placement and coverage optimization

#### C. Satellite Communications:

- Satellite systems for voice, data, and multimedia transmissions
- Satellite network topologies and transmission protocols

- Ground station infrastructure and operations

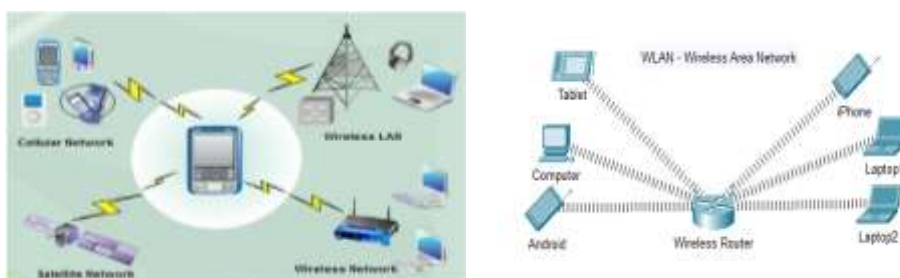
#### **D. Internet of Things (IoT) Connectivity:**

- Low-power wide-area networks for IoT devices (e.g. LoRaWAN, NB-IoT)
- Wireless protocols and standards for industrial, commercial, and consumer

IoT

- Integration of wireless IoT systems with cloud platforms

Graduates in this field can pursue careers as wireless network engineers, cellular system architects, IoT solution developers, and more across the telecommunications, technology, and industrial sectors. Strong technical skills in areas like signal processing, electromagnetics, and network protocols are essential [7].



**Figure 3.** Automatic system discovery is one of the features provided by 4G networks, Wi-Fi and WLAN

### **3.3. Satellite Communications**

Satellite communications rely on the transmission of EM waves, primarily in the microwave and radio frequency bands, to establish global communication networks. Satellites, positioned in various orbits around the Earth, receive and transmit signals to and from ground stations and user terminals, enabling a wide range of applications, including voice and data communication, television broadcasting, and global positioning systems.

Satellite Communications is a specialized area within the broader Cellular and Wireless Communications discipline. It focuses on the design, deployment, and operation of satellite-based telecommunication systems. The key aspects include:

#### **A. Satellite System Architecture:**

- Different satellite orbits (e.g. geostationary, low-earth orbit, medium-earth orbit)
- Satellite payload design (transponders, antennas, power systems)
- Ground segment infrastructure (control stations, earth stations, user terminals)

#### **B. Satellite Network Protocols:**

- Satellite access methods (FDMA, TDMA, CDMA)
- Routing and handoff protocols for seamless connectivity
- Network management and control systems



**C. Satellite Services and Applications:**

- Direct-to-home (DTH) TV broadcasting
- Mobile satellite services (voice, data, IoT)
- Broadband internet via satellite
- Satellite-based navigation and positioning (GPS, Galileo, GLONASS)

**D. Emerging Trends:**

- High-throughput and software-defined satellites
- Integration of satellite and terrestrial networks
- Use of satellite constellations for global coverage

Graduates in Satellite Communications can work as satellite system engineers, network architects, ground segment operators, and in other technical roles at satellite operators, service providers, and aerospace companies. Expertise in areas like electromagnetic theory, digital communications, and aerospace engineering is highly valued [8].

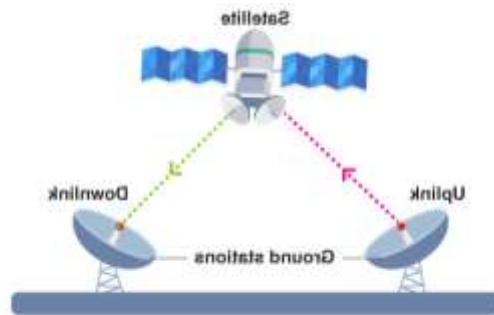


Figure 4. Satellite Communications

**3.4. Radar and Remote Sensing**

Radar (Radio Detection and Ranging) systems utilize EM waves, typically in the microwave and millimeter-wave regions, to detect and track objects, measure distances, and gather information about the surrounding environment. These systems have various applications, such as weather forecasting, air traffic control, and military surveillance [9]. Similarly, remote sensing technologies, which rely on the interaction of EM waves with the Earth's surface and atmosphere, have become an essential tool for environmental monitoring, resource management, and Earth observation.

Radar and Remote Sensing is a multidisciplinary field that encompasses the design, development, and application of technologies that use electromagnetic radiation to detect, locate, and characterize objects from a distance. The key areas of focus include:

**A. Radar Systems:**

- Principles of radar operation (transmitters, receivers, antennas)

- Different radar types (pulsed, continuous-wave, synthetic aperture)
- Radar signal processing and target detection/tracking algorithms

### **B.Remote Sensing Platforms:**

- Airborne and space borne sensors (e.g. satellites, drones, aircraft)
- Passive (e.g. imaging spectroscopy) and active (e.g. lidar, SAR) sensing
- On-board data acquisition, storage, and transmission systems

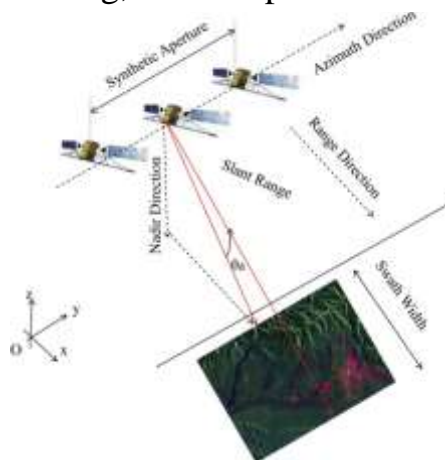
### **C.Applications of Radar and Remote Sensing:**

- Meteorology and weather forecasting
- Terrain mapping, land-use monitoring, and agriculture
- Surveillance, homeland security, and military defense
- Oceanography and marine environment monitoring

### **D.Data Processing and Analytics:**

- Algorithms for image processing, classification, and feature extraction
- Integration of radar/remote sensing data with GIS and other datasets
- Big data management and cloud-based analytics platforms

Graduates in this field can pursue diverse careers as radar engineers, remote sensing scientists, geospatial analysts, and more in sectors like aerospace, defense, environmental monitoring, and urban planning. Strong backgrounds in electromagnetics, signal processing, and computer vision are essential [10].



**Figure 5.** Radar and Remote Sensing

### **3.5. Optical Communications**

The development of fiber-optic communication systems has revolutionized the way data is transmitted over long distances. These systems use EM waves in the infrared and visible light spectrum to transmit information at extremely high speeds and with low signal degradation. Optical communication technologies have been crucial for the growth of the internet and the increasing demand for high-bandwidth applications, such as video streaming and cloud computing.

Optical Communications is a specialized domain that focuses on the transmission of information using light waves, typically through fiber optic cables or free-space optical links. The key areas of focus include:

**A. Fiber Optic Systems:**

- Optical fiber properties, propagation, and attenuation
- Optical transmitters (e.g. lasers, LEDs) and receivers
- Fiber optic cable design, installation, and maintenance

**B. Optical Network Architectures:**

- Wavelength-division multiplexing (WDM) techniques
- Passive optical networks (PONs) for broadband access
- Long-haul backbone networks and submarine cables

**C. Free-Space Optical Communications:**

- Line-of-sight laser communication links
- Atmospheric turbulence mitigation and adaptive optics
- Space-based optical links for satellite communications

**D. Photonic Devices and Components:**

- Optical amplifiers, modulators, switches, and filters
- Photonic integrated circuits and optical microchips
- Optoelectronic integration with electronics

**E. Optical Communications Protocols:**

- Ethernet-over-Fiber and Fiber Channel standards
- Synchronous optical networking (SONET/SDH) protocols
- Emerging software-defined optical networking

Graduates in Optical Communications can work as fiber optic network engineers, photonic device designers, system architects, and more in the telecom, data center, and defense industries. Strong backgrounds in optics, electromagnetics, and digital signal processing are essential [11].



Figure 6. Optical fiber communications

#### 4. Challenges and Future Developments

As the world becomes increasingly connected, the demand for efficient and reliable communication technologies continues to grow. One of the primary challenges in the field of modern communications is the efficient utilization of the limited EM spectrum, which is a finite resource. The development of advanced modulation techniques, sophisticated antenna systems, and dynamic spectrum management strategies are crucial for addressing this challenge [12].

The emergence of 5G and beyond wireless technologies, with their promise of higher data rates, lower latency, and support for a massive number of connected devices, is another significant development in the field of EM wave-based communications [13]. Additionally, the integration of satellite and terrestrial communication systems, as well as the exploration of new regions of the EM spectrum, such as the terahertz and visible light bands, are areas of active research and development [14].

Here are some of the key challenges and future developments in Cellular and Wireless Communications as of 2024:

### **Challenges:**

- **5G Rollout and Evolution:** The full-scale deployment of 5G networks is still ongoing, with challenges around infrastructure upgrades, spectrum allocation, and seamless integration with legacy 4G systems.
- **IoT Connectivity and Scalability:** Connecting vast numbers of diverse IoT devices with stringent latency, power, and cost requirements is a significant challenge. Protocols and architectures need to scale efficiently.
- **Spectrum Scarcity and Management:** The increasing demand for wireless bandwidth is straining the available spectrum. More efficient spectrum utilization techniques and novel frequency bands are needed.
- **Network Security and Privacy:** The vulnerability of wireless networks to hacking, eavesdropping, and other cyber threats requires robust security measures and privacy-preserving protocols.
- **Energy Efficiency and Sustainability:** Reducing the carbon footprint and energy consumption of wireless networks, especially for 5G and IoT, is crucial for environmental sustainability.

### **Future Developments:**

- **6G and Beyond:** Research is underway for 6G and future wireless generations, exploring technologies like terahertz communications, intelligent surfaces, and holographic beamforming.
- **Integrated Satellite-Terrestrial Networks:** The convergence of satellite and terrestrial wireless networks to



provide ubiquitous global connectivity, redundancy, and resilience.

- **Quantum-Secured Communications:** The use of quantum mechanics principles for unbreakable encryption and ultra-secure wireless data transmission.
- **Artificial Intelligence and Machine Learning:** Applying AI/ML for autonomous network management, adaptive resource allocation, and intelligent decision-making in wireless systems.
- **Programmable Wireless Platforms:** Software-defined and virtualized wireless networks that can be dynamically reconfigured and optimized through open APIs and cloud-native architectures.

These are some of the key focus areas that will shape the future of Cellular and Wireless Communications in the coming years and decades [15].

## 5. Conclusion

Electromagnetic waves have been the foundation of modern communication technologies, enabling a wide range of applications that have transformed the way we transmit and receive information. From radio and television broadcasting to cellular and optical communications, EM waves have played a pivotal role in shaping the global connectivity that we enjoy today. As the demand for communication technologies continues to grow, the role of EM waves in the future of communication will become increasingly important, driving the development of more efficient, reliable, and innovative communication systems.

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## MULTIMEDIYA KONTENTDAN FOYDALANISHDA O'ZIGA XOS XUSUSIYATLARI

**A. E. Axmedova**

SamDAQU "Axborot texnologiyalari" kafedrası o'qituvchisi

### ANNOTATSIYA

Ushbu maqolaning asosiy mazmun mohiyati bugungi kunda jahon miqyosida tabora ommalashib va dolzorblashib borayotgan multimedia kontentlarning asosiy xususiyatlari, ularning afzalliklari hamda kamchiliklari va ularga qarshi amalga oshirilayotgan xavflar haqida fikr-mulohazalar bayon etilgan.

**Kalit so'zlar.** Multimedia, content, static, dinamik, xavfsizlik, audio, bideo, animatsiya, web ilovalar, grafika, interaktivlik.

### ABSTRACT

The main content of this article is the main features of multimedia content, which are becoming more and more popular and becoming more popular today, their advantages and disadvantages, and opinions about the risks that are being implemented against them.

**Keywords.** Multimedia, content, static, dynamic, security, audio, video, animation, web applications, graphics, interactivity.

### KIRISH

Axborot-kommunikatsiya texnologiyalari va tizimlarini harakatga keltiruvchi resurslar bu axborotli kontentlar va ularning oqimidir. Axborotli kontentni yanada jozibali va xaridorgir qilish yo'llari va mexanizmi esa mul'timediya vositalar ko'magidir. Har qanday axborot turi kontent bo'la oladi, faqatgina unga sifatli ishlov va samarali mehnat talab etiladi. Jahon biznes olamida tovarimizning xaridorgirligi quyidagi parametrlarga bog'liq bo'ladi: sifati, dizayni, ommobobligi va universalligi.

Mul'timediya kontenti, zamonaviy axborot texnologiyalari sohasida keng qo'llaniladi va ushbu kontent turli maqsadlar uchun ishlatiladi, masalan, iqtisodiyotda, qurilishda ta'lim, reklama, o'yinlar va boshqa ko'plab sohalarda. "Multimedia kontent" tushunchasi, turli xil axborot turlarini (matn, audio, video, grafika va animatsiya) birlashtiradigan elektron axborotni anglatadi. Bu tushuncha, foydalanuvchilarga ko'proq interaktiv va qiziqarli tajriba taqdim etish uchun ishlatiladi. Masalan, veb-saytlar, elektron ta'lim dasturlari, interaktiv reklamalar va ijtimoiy media kontentlari multimedia



kontentiga misol bo'la oladi. Bu kontentlar axborotni yanada samarali va jalb qiluvchi tarzda yetkazish imkonini beradi.

### ADABIYOTLAR TAHLILI VA METODOLOGIYA

Endi mul'timediya kontentining asosiy turlari va shakllarini ko'rib chiqamiz[1]:

- **matn.** Bu eng oddiy mul'timediya elementi bo'lib, veb-sahifalar, elektron kitoblar va boshqa elektron hujjatlarda ishlatiladi. Matn turli shriftlar, ranglar va formatlar yordamida taqdim etilishi mumkin.

- **Grafika.** Statik (qattiq) yoki dinamik (harakatlanuvchi) rasmlar shaklida bo'lishi mumkin. Grafika, veb-dizayn, reklama bannerlari va foydalanuvchi interfeyslarida keng qo'llaniladi.

- **Audio.** Musiqa, ovozli yozuvlar, effektlar kabi tovush elementlarini o'z ichiga oladi. Audio kontent podkastlar, musiqiy albomlar, elektron o'quv materiallari va o'yinlarda keng tarqalgan.

- **Video.** Harakatli tasvirlar yoki qisqa filmlar shaklida bo'lib, o'quv kurslari, YouTube videolari, film va teleshoular uchun ishlatiladi. Video kontent eng samarali axborot yetkazish usullaridan biri hisoblanadi.

- **Animatsiya.** Grafik elementlarning harakatlanishini o'z ichiga oladi. Animatsiyalar, ta'lim dasturlari, o'yinlar va animatsion filmlar kabi ko'plab sohalarda qo'llaniladi.

- **Interaktiv elementlar.** Foydalanuvchi bilan o'zaro ta'sir qilish imkonini beruvchi elementlar. Masalan, viktorinalar, interaktiv haritalar va o'yinlar. Bu turdagi kontent, foydalanuvchilarni jalb qilish va ularga ta'sirchan tajriba berish uchun ishlatiladi.

#### Mul'timediya kontentining asosiy shakllari.

- **Veb-sahifalar:** Turli xil mul'timediya elementlarini birlashtiruvchi elektron hujjatlar.

- **Elektron kitoblar va jurnallar.** O'quv yoki ko'ngil ochish materiallarini taqdim etish uchun ishlatiladi.

- **Elektron o'quv kurslari:** Ta'lim materiallarini interaktiv tarzda taqdim etish.

- **Mobil ilovalar,** Har kuni ishlatiladigan qurilmalar uchun mo'ljallangan dasturlar.

- **Reklama kompaniyalari.** Mahsulot yoki xizmatlarni targ'ib qilish uchun ishlatiladigan interaktiv yoki statik grafik va video materiallar.

- **O'yinlar.** Interaktiv o'yin elementlari orqali foydalanuvchilarga ko'ngil ochish imkoniyatini beradi.

Mul'timediya kontenti zamonaviy axborot texnologiyalari sohasida muhim rol o'ynaydi va uning turli shakllari



foydalanuvchilarga qulay, samarali va estetik jihatdan yoqimli axborot yetkazish imkonini beradi.

Mul'timediya kontenti bu - axborotni turli shakllarda yetkazib berish usuli. Bunda muhim tushunchalar - ob'ekt va predmet. Ushbu tushunchalar mul'timediya kontenti bilan bog'liq muayyan tushunchalarni aniqroq tavsiflash uchun qo'llaniladi.

Mul'timediya kontentining ob'ekti bu - mul'timediya kontenti ishlab chiqarilayotgan yoki qo'llanilayotgan soha yoki mavzu. Masalan, ta'lim dasturi ob'ekt sifatida: tarix, matematika, fan yoki boshqa ta'lim sohalari. Reklama kompaniyasida esa ob'ekt mahsulot yoki xizmat bo'lishi mumkin. O'yinlar sohasida ob'ekt, odatda, o'yinning o'zi yoki uning qahramonlari va voqealari hisoblanadi.

Mul'timediya kontentining predmeti esa - bu uning mazmuni, ya'ni qanday axborot yoki ma'lumotlar yetkazilayotgani. Bu tushuncha mul'timediya kontentini yaratishda ishlatiladigan uslublar, texnikalar va yondashuvlarni ham o'z ichiga oladi. Multimedia kontentni predmetga misollar:

**1. Ta'limda.** Interaktiv darslar, video ma'ruzalar, elektron kitoblar va boshqa o'quv materiallari.

**2. Reklama.** Mahsulotni targ'ib qilish uchun ishlatiladigan grafik va video materiallar, jumladan, bannerlar va tijorat roliklari.

**3. O'yinlar.** Grafika, animatsiya, audio effektlar va foydalanuvchi bilan o'zaro ta'sir qilish mexanizmlari.

Mul'timediya kontentining ob'ekti va predmeti uning samaradorligini va qabul qilinishiga ta'sir qiluvchi muhim omillar hisoblanadi. Samarali mul'timediya kontenti ob'ekt va predmetni to'g'ri tanlash va ulardan foydalanish orqali foydalanuvchilar e'tiborini tortishi va ularning qiziqishlarini qondirishi kerak.

Multimediali kontentni afzalliklari va kamchiliklari

Multimediali kontent, bu turli xil matnlar, grafikalar, audio va video kabi axborot turlarini birlashtirgan axborot resursi hisoblanadi. Ushbu turdagi kontent ta'lim, marketing, va ko'ngilochar sohalarda keng qo'llaniladi. Quyida multimedia kontentning asosiy afzalliklari va kamchiliklari bayon qilib o'tamiz:

Multimedia kontentining afzalliklari aniq. Birinchidan, bu ma'lumotni vizual idrok etishni yaxshilashga yordam beradi, uni yanada vizual va esda qolarli qiladi. Audio va video materiallar ma'lumotni yanada qiziqarli va ixcham shaklda etkazish imkonini beradi animatsiya dinamikani yaratadi va foydalanuvchi e'tiborini tortadi[3].

Boshqa yana bir qator afzalliklari. **English qobiliyati:** multimedia kontent, turli xil o'qish va o'rganish usullarini qo'llagan holda, foydalanuvchilarga ma'lumotlarni o'zlashtirishda yordam beradi. Masalan, vizual va audio materiallar orqali ta'lim oluvchilar uchun qiyin mavzular ham tushunarli bo'lishi mumkin.

**Interaktivlik:** multimedia dasturlari foydalanuvchilarni faol ishtirok etishga undaydi. Bu, masalan, interaktiv testlar yoki o'yinlar orqali bilimlarni mustahkamlash imkonini beradi.

**Qiziqishni oshirish:** rang-barang grafika, video va audio fayllar foydalanuvchilarning diqqatini tortadi va ularning qiziqishini saqlashga yordam beradi, bu esa o'z navbatida o'rganish samaradorligini oshiradi.

**O'ziga xos ma'lumotlar taqdimoti:** multimedia vositalari orqali murakkab g'oyalar va tushunchalar aniq va sodda tarzda ifoda etilishi mumkin.

Kamchiliklari. **Yaratish qiymati:** yuqori sifatli multimedia kontentni yaratish uchun ko'p vaqt va mablag' talab etiladi. Professional dizayn va texnik ko'nikmalar talab qilinadi.

**Texnik talablar:** multimedia fayllarni ko'rish yoki tinglash uchun zarur bo'lgan texnik vositalar (masalan, kompyuterlar, smartfonlar) hamda tezkor internet aloqasi talab etiladi.

**Diqqatni chalg'itish:** ba'zi hollarda, multimedia elementlari haddan tashqari ko'p bo'lganda, foydalanuvchilarning asosiy mavzu yoki ma'lumotdan diqqati chalg'ishi mumkin.

**Universal emasligi:** ba'zi multimedia kontentlar turli qurilmalar yoki dasturiy ta'minotlar bilan mos kelmasligi mumkin, bu foydalanuvchilarni cheklashi mumkin. Multimedia kontentning foydalanish uslubiga qarab, uning afzalliklari va kamchiliklarini aniq belgilash mumkin. Uning qo'llanilishi maxsus e'tiborga muhtoj bo'lgan sohalarda ko'proq samara berishi mumkin.

### **Multimediali kontentning ijobiy va salbiy oqibatlari.**

Multimediali kontentning ta'siri turli omillarga bog'liq bo'lib, uni qo'llash sohasiga va maqsadiga qarab o'zgarishi mumkin. Quyida multimedia kontentining ijobiy va salbiy oqibatlari haqida batafsil ma'lumot berib o'tamiz.

Ijobiy oqibatlari:

**1.Ta'limdagi Samara.** Multimedia vositalari ta'lim jarayonini boyitadi va o'quv materiallarini turli xil usullar bilan taqdim etish orqali o'rganish samaradorligini oshiradi. Audiovizual materiallar murakkab tushunchalarni tushuntirishda yordam beradi, bu esa ta'lim olish jarayonini yanada qiziqarli va tushunarli qiladi.

**2.Qiziqish va Motivatsiya.** Multimedia kontent, ayniqsa yoshlar orasida, o'quv materiallariga bo'lgan qiziqishni oshirishi va motivatsiyani yuksaltirishi mumkin. Bu holat o'quvchilarning mavzuni chuqurroq o'rganish istagini kuchaytiradi.

**3.Muloqot va hamkorlik:** Multimedia vositalari guruh ishlarida hamkorlikni qo'llab-quvvatlaydi. Masalan, video yoki slayd taqdimotlarni birgalikda tayyorlash jarayoni o'quvchilarning jamoaviy ishlash ko'nikmalarini rivojlantiradi.



**4.Axborotga Oson Kirish.** Internet orqali tarqatiladigan multimedia kontent dunyo bo'ylab tezkor va oson axborot almashinuvini ta'minlaydi, bu esa foydalanuvchilarga zarur ma'lumotlarni tez va oson topish imkonini beradi.

Salbiy Oqibatlari.

**1.Qimmatbaho resurslar.** Yuqori sifatli multimedia kontentni yaratish uchun zarur bo'lgan texnologik resurslar va mutaxassislar jalb qilish ko'p mablag' va vaqt talab etadi.

**2.Texnik Cheklovlar.** Ba'zi foydalanuvchilarning eskirgan yoki cheklangan texnik imkoniyatlari multimedia kontentdan foydalanishni qiyinlashtirishi mumkin. Bunday cheklovlar, masalan, sekin internet yoki eskirgan qurilmalar bilan bog'liq bo'lishi mumkin.

**3.Diqqatni chalg'itish.** Multimedia elementlari ba'zan asosiy mavzu yoki maqsaddan diqqatni chalg'itishi mumkin. Bu ayniqsa, grafikalar va animatsiyalar haddan tashqari ko'p ishlatilganda sodir bo'lishi mumkin.

**Foydalanuvchilar uchun qulaylik.** Ba'zi foydalanuvchilar multimedia elementlardan foydalanishda qiyinchiliklarga duch kelishi mumkin, masalan, eshitish yoki ko'rish qobiliyati cheklangan kishilar uchun qo'shimcha qiyinchiliklar tug'dirishi mumkin.

Shunday qilib, multimedia kontentning ta'siri uning qo'llanilish uslubi va maqsadiga qarab o'zgaradi, shuning uchun uning samaradorligini maksimal darajada oshirish uchun qo'llaniladigan sohaga mos ravishda yaxshilab rejalashtirish talab etiladi.

Multimediali kontentni himoyalashdagi muammolari.

Multimediali kontentni himoyalash, uning noyoblighi va intellektual mulk huquqlarini saqlab qolish uchun muhimdir, lekin bu jarayonda turli xil muammolar yuzaga kelishi mumkin. Quyida multimedia kontentni himoyalashdagi asosiy muammolar va ularning sabablari haqida batafsil tushuncha beramiz.

**1. Mualliflik huquqlarining buzilishi.** Multimedia kontentni internet orqali tarqatish juda oson bo'lgani uchun, mualliflik huquqlarini buzish holatlari ko'p uchraydi. Masalan, ruxsatsiz nusxa ko'chirish, qayta tarqatish yoki tahrir qilish keng tarqalgan. Bu esa asl yaratuvchilar uchun moddiy va ma'naviy zararlar keltirib chiqarishi mumkin.

**2. Raqamli huquqni boshqarish (DRM) tizimlarining cheklovlari.** DRM tizimlari kontentni nusxa ko'chirishdan va noqonuniy tarqatishdan himoya qilish uchun ishlatiladi. Biroq, bu tizimlar foydalanuvchilarning qonuniy foydalanish huquqlarini cheklashi yoki ularning tajribasini buzishi mumkin. Masalan, ba'zi DRM tizimlari foydalanuvchilarga faqat ma'lum

bir qurilmada yoki dasturiy ta'minotda kontentdan foydalanishga ruxsat beradi.

**3. Raqamli huquqni boshqarishning buzilishi.** Raqamli huquqni boshqarish tizimlarining o'zi ham buzilishi mumkin, bu esa mualliflik huquqlarini yanada qiyin himoya qilishga olib keladi. Kalitlarni o'g'irlash kabi usullar orqali DRM himoyasi osonlikcha chetlab o'tilishi mumkin.

**4. Raqamli ma'lumotlarni suiste'mol qilish.** Multimedia kontentni noto'g'ri tarzda ishlatish yoki suiste'mol qilish, masalan, siyosiy propaganda yoki dezinformatsiya tarqatish uchun ishlatilishi mumkin. Bu esa kontentning asl maqsadidan chetla-shishiga va jamiyatda noto'g'ri tasavvurlarni shakllantirishiga sabab bo'ladi.

**5. Tekshiruv va nazoratning murakkabligi.** Internetda kontentni nazorat qilish va tekshirish juda murakkab jarayon bo'lib, doimiy ravishda yangilanib turadigan texnologiyalar va usullarni talab etadi. Buning uchun katta miqdorda resurslar va mutaxassislar zarur bo'ladi.

**6. Xalqaro miqyosdagi farqlar.** Turli mamlakatlarda intellektual mulkka oid qonunchilik farq qilishi mumkin, bu esa xalqaro miqyosda multimedia kontentni himoya qilishni yanada murakkablashtiradi. Xalqaro miqyosda muvofiqlashtirilgan qoidalarni ishlab chiqish va amalga oshirish talab etiladi.

## XULOSA

Multimedia kontentni himoyalashda yuqorida sanab o'tilgan muammolarni hal etish uchun texnologik yechimlar, qonunchilik va xalqaro hamkorlik kabi kompleks yondashuvlar zarur. Bu esa, o'z navbatida, kontent yaratuvchilarning huquqlarini himoya qilish va foydalanuvchilarning huquqlarini muvozanatli ta'minlashni o'z ichiga oladi.

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## EXPLORING KHALED HOSSEINI'S CULTURAL AND SCIENTIFIC ACHIEVEMENTS

**Abdul Wadood Hakim**

Teaching Assistant, English Department, Language and Literature  
Alberoni University, Kapisa, Afghanistan  
[hakimabdulwadood2022@gmail.com](mailto:hakimabdulwadood2022@gmail.com)

**Mohammad Agha Elham**

Teaching Assistant Pashto Department, Language & Literature Al-Beroni  
University, Kapisa, Afghanistan  
[mohammadaghaelham77@gmail.com](mailto:mohammadaghaelham77@gmail.com)

**Dadallah Hanifi**

Teaching Assistant, Physics, Education, Al-Beroni University, Kapisa,  
Afghanistan  
[dadallah2021@gmail.com](mailto:dadallah2021@gmail.com)

### ABSTRACT

Writers are going to write novels for a variety of reasons. Perspectives are elevated by the intriguing subjects that authors write about, the settings in which they write, or even the significant positions that writers represent in society through their representation of culture and science. Khaled Hosseini has consequently gained recognition for his authentic depiction of his native Afghanistan. His early childhood is eloquently portrayed in his writings, which also mirror real-world incidents. His stories are set against the backdrop of Afghanistan's history, traditions, culture, and ethnic variety. His themes—difficulties and obstacles—do not pertain exclusively to any one country or culture.

Hosseini's scientific and cultural accomplishments are all over the world the most impassioned novels, despite being categorized under several labels. These are best-selling novels written by Afghan-American authors who delved into the academic, cultural, and historical accomplishments of various ethnic groups in Afghanistan. The goal of this study is to look at the causes of scientific and cultural achievements since they are referenced in Hosseini's works. The writer's social approaches, viewpoints, and



fundamental accomplishments will be expounded upon in this essay. This issue's outcome demonstrates how social structural elements and social variables in Afghanistan society contribute to scientific and cultural accomplishments.

**Keywords:** Scientific Achievement, Novel, Culture, Factors

## Introduction

The well-known Afghan-American author Khaled Hosseini writes all over the world. Hosseini was born in Kabul, Afghanistan, on March 4, 1965. He was the eldest of five children raised by his parents and resided in Kabul till he was eleven years old. Khaled was born in the Afghan city of Herat, to Tajik and Pashtun parents. His mother taught Farsi and history at Kabul Senior High School. His father worked as a diplomat for the Afghan Foreign Ministry. Hosseini was raised in the wealthy Wazir Akbar Khan neighborhood, which is among Kabul's oldest neighborhoods, for roughly eight years of his early life. Khaled's family relocated to Tehran, Iran, in the early 1970s when his father was assigned to a diplomatic position in the Afghan Embassy in Tehran. Their return to Kabul was in 1973.

In 1976, Khaled Hosseini and his family were relocated to Paris by the Foreign Ministry. As they prepared to leave Kabul in 1980, the merciless Soviet Army launched an invasion. Following that, Hosseini's family requested and was given political asylum in the United States. In September 1980, Hosseini and his family relocated to San Jose, California. Until recently, Khaled Hosseini has resided in Northern California. Khaled Hosseini received his senior high school diploma in 1984. He earned a bachelor's degree in biology from Santa Clara University. Khaled enrolled in the University of California, San Diego's School of Medicine the following year. After completing his medical education in 1993, Hosseini practiced internal medicine from 1996 until 2004. Afghan immigrant Khaled Hosseini studied in the US and managed to subtly adjust to and thrive in his new nation. His accomplishments in English literature and his later transition into an Afghan-American writer when *The Kite Runner* was published serve as proof of this. *The Kite Runner* is set in Pakistan, Afghanistan, and the United States.

"*The Kite Runner*" by Khaled Hosseini is one of those exceptional stories that stays with you long after it was first published in 2001. The story was eventually translated into English in 2003 by Riverhead Books. With sales in 70 countries and more than 100 weeks on the New York Times bestseller list, this debut became an international best seller. Due to his remarkable success with *The Kite Runner*, Khaled Hosseini was designated as a "Goodwill Envoy" by the UNHCR, who also used him to travel to Afghanistan as part of their



establishment of "The Khaled Hosseini Foundation." This charitable organization supports the people of Afghanistan by offering humanitarian aid. Acknowledging The Kite Runner's remarkable accomplishments, Hosseini created "A Thousand Splendid Suns," his second book, which was published in 2007. The New York Times ranked this book as their number one read. Hosseini gave readers a fresh perspective on Afghanistan, a country that had long been cut off from the outside world.

Over ten million copies of those two novels have been sold in the United States and over thirty-eight million copies globally. Given Hosseini's enormous literary accomplishments, "The Kite Runner adapted into graphic novel" was published later in 2011. On May 21, 2013, Hosseini published his third book, "The Mountains Echoed." Khaled Hosseini's novels have been the subject of several investigations and scholarly criticisms from Afghans up to this point due to the fact that they were not published in his native tongue.

### Literature Review

The well-known Afghan-American author Khaled Hosseini writes all over the world. He wrote Sea Prayer (2018), The Kite Runner (2001), The Mountains Echoed (2013), and A Thousand Splendid Sun (2007). Among the immigrants from Afghanistan is Khaled Hosseini. "who studied in Los Angeles, and subtly could adopt and develop in the host country" (Farlina, 2008). This is demonstrated by his literary achievements and rise to prominence as a writer with the publication of The Kite Runner "Hosseini is most known for his fictitious depiction of Afghanistan in The Kite Runner. Khaled Hosseini was born on March 4, 1965, in Kabul, Afghanistan. He currently lives abroad. Hosseini's love for his country is not limited to his writings. His passion for Afghanistan is demonstrated by his activism for its betterment. Since 2006, Hosseini has directed the Khaled Hosseini Foundation, which provides assistance to the Afghan people, and he has also served as a goodwill representative for the UN Refugee Agency. The establishment of the foundation followed Hosseini's 2007 tour to Afghanistan. Hosseini was deeply troubled by what he saw when he returned to his birth country after not having been there for 27 years (Hosseini, 2017).

The connection between Amir and Hassan, as they negotiate the politics of societal and familial hierarchies, serves as a vehicle for highlighting the prevalent ethnic conflict in Afghanistan in the late 20th century. "Racism and racial prejudice are two flaws in human society from the 16th through the 19th century; however, they are not considered scientific findings" (Hosseini, 2016).

Scholarly commentary on the book after its release has mostly concentrated on how the book affected western readers in the aftermath of September 11, 2001. In total, Hosseini's 2008 book A Thousand Splendid Suns and The Kite Runner sold over 10 million copies in





the US and over 38 million copies globally. Since *The Kite Runner* became an international sensation upon its release, a great deal of writing and research has been done on the book's influence on popular culture, especially in Western countries.

Hosseini portrays the complicated life in Afghanistan in an intuitive manner with regard to the cause-and-effect relationships, and he does not shun away from passing moral judgments on his characters. His realistic writing attracts the interest both of the readers and the critics. Hosseini is praised for his family appeal, realistic writing and his masculine characters.

*The novel of The Kite Runner is set in Afghanistan*, “which illustrated the social changes in Afghanistan in the last 30 years” (Yuan-yuan, 2018). *The Kite Runner* is the debut novel that became an International Best Seller after being published in English by “Riverhead Books” in 2003. It was published in seventy countries and stayed on the New York Times bestseller list for almost a hundred weeks.

Because to *The Kite Runner*'s success, Hosseini was designated as a "Goodwill Envoy" by the UN High Commissioner for Refugees. After visiting Afghanistan with the UNHCR, Hosseini formed the Khaled Hosseini Foundation. This non-profit group helps Afghans in need through humanitarian aid. Since his novels were not published in his mother tongue, there is no scholarly Hosseini criticism in Afghanistan. This article intends to offer an analysis of Hosseini's works from an Afghan scholar's perspective. “*The Kite Runner* is typically read by Western scholars as a novel which popularized more sympathetic depictions of Middle Eastern people at a time when American perception and media coverage was primarily negative” (Duke, 2019).

On March 4, 1965, Khaled Hosseini was born in Kabul, Afghanistan. Raised by his parents, he was the oldest of five children and lived in Kabul until the age of eleven. Khaled was born in the Afghan city of Herat, to Tajik and Pashtun parents. His mother taught Farsi and history at Kabul Senior High School. His father worked as a diplomat for the Afghan Foreign Ministry. Hosseini's family was rich, and they spent about eight years of his childhood in the district of Wazir Akbar Khan, one of the most ancient areas of the capital, Kabul. Khaled's family relocated to Tehran, Iran, in the early 1970s when his father was assigned to a diplomatic position in the Afghan Embassy in Tehran. Their return to Kabul was in 1973.

The Foreign Ministry moved Khaled Hosseini and his family to Paris in 1976. In 1980, just as they were ready to return, the ruthless Soviet Army invaded Kabul. Following that, Hosseini's family requested and was given political asylum in the United States. In September 1980, Hosseini moved to San Jose, California, with his family. Until recently, Khaled Hosseini has resided in Northern California. Khaled Hosseini received his



senior high school diploma in 1984. He graduated from Santa Clara University with a bachelor's degree in biology. The next year, Khaled enrolled at the University of California, San Diego's School of Medicine. After completing his medical education in 1993, Hosseini practiced internal medicine from 1996 until 2004. With his newfound affluence, Hosseini has been able to put an end to his medical practice and use his reputation to support his fellow citizens who are in need, a cause he has deemed as important as his "literary interest." An Afghan refugee who studied in the United States, Khaled Hosseini found a subtle way to adapt and thrive in his new environment. "This is evidenced by his success in English literature and his subsequent transformation into an Afghan-American author following the publication of *The Kite Runner*" (Hansen, 2003).

*The Kite Runner* is set in Afghanistan, Pakistan and the United States. "This novel illustrates the story of a young Afghan boy named "Amir" and his wealthy father" (Hosseini, 2016). The section on Afghanistan covers the pre-colonial, colonial, and post-colonial periods. In this book, Hosseini portrays Afghanistan as a country with a diversified population of cultures and nationalities, a challenging way of life, and people who have suffered at the hands of foreign invaders and fellow inhabitants. "The culture of Afghanistan reflects its ancient roots and position as a crossroads for invading ethnic groups and traditions" (Nedungayil, 2017). *While exploring topics like ethnic prejudice, the fallout from racial discrimination, the Soviet Union invasion, Taliban rule, the refugee crisis, the disorder of Afghan society, tribal customs, religious beliefs, religious ties, and cultural clashes, The Kite Runner tells the story of the Afghan people.* A nation on the brink of destruction is the setting for the brilliantly written story *The Kite Runner*. The plot of the work is strongly tied to ethnic groups, history, topography, the Soviet invasion, the emergence of the Taliban, 9/11, and the US invasion of Afghanistan. It covers the period from before the Soviet invasion of 1979 until the Taliban collapse and the subsequent reconstruction.

Children start to identify their true interests during the school years, and their confidence is crucial to their future growth. If their parents acknowledge and support them, kids will work hard to complete their assignments and maintain their perseverance. "When he was ten years old, Amir became interested in reading and writing" (Kaifu, 2019). But instead of offering to read the story he had written, his father simply gave him a blank stare when he went to show him. Amir felt that he was being ignored because of this. At this point, he ought to have been inspired to engage in further activities related to his passion.

Hosseini's first book, *The Kite Runner*, was published in 2001. In the end, Riverhead Books published *The Kite Runner* on May 29, 2003. This gripping tale shows Afghanistan engulfed in a



horrific war between rival factions fighting for dominance and control over the nation. This fictional narrative encompasses actual political and historical occurrences from the demise of the Afghan monarchy in the 1970s to the immediate aftermath of the Taliban. The story is based on Hosseini's personal memories of growing up in Kabul's Wazir Akbar Khan neighborhood, as well as his eventual relocation in the United States. Sudesna Som acclaims Hosseini's transformation from a physician into a writer with the publication of *The Kite Runner*, "A physician by profession, Khaled Hosseini became a popular name in the field of contemporary English literature, with the publication of his first novel *The Kite Runner*" (Hosseini, 2003). The novel, which was written against the backdrop of Afghanistan, a nation that has been all but destroyed by ongoing conflict and international intervention, was well praised and remained at the top of the New York Times best-seller list for more than a year. The book was a global best-seller, released in over 70 countries. Motivated, Mark Forster directed the 2007 global premiere of the Academy Award-nominated picture of the same name.

The United Nations High Commissioner for Refugees appointed Hosseini as a Goodwill Envoy as a result of the novel's success. Hosseini subsequently traveled to Afghanistan with the UNHCR and founded The Khaled Hosseini Foundation, a non-profit organization dedicated to giving humanitarian help to Afghans. Inspired by the book's remarkable success, Hosseini wrote *A Thousand Splendid Suns*, which Riverhead Books released on May 22, 2007. More than ten million copies of these two novels were sold in the US and more than thirty-eight million copies worldwide. Later in 2011, Khaled Hosseini's *The Kite Runner* was turned into a graphic novel.

The way that Hosseini presents Afghanistan differs from that of other authors. The majority of authors that write about Afghanistan are more preoccupied with issues of pain, cultural shock, and solitude. In *The Kite Runner*, Hosseini presented a new cultural portrait of Afghanistan by illustrating the intricacies of the friendship-building process as well as other problems that arise in the country both during the colonial and post-colonial eras. As the writer has mentioned in article which "postcolonial literature refers to works that have been influenced by the imperial practice from colonization to present day" (Allan, 1998).

Hosseini let readers see Afghanistan through new eyes which have been closed to the outside world for a long time. Since the period before the Soviet invasion of Afghanistan is largely forgotten in current Afghan history, Hosseini endeavors to write about it to refresh people's memory and to record the history. For many people in the West, Afghanistan is still associated with the Soviet war. Because of Afghan tradition, Hosseini wants to remind people that Afghans have long been able to live in peace and obscurity.



Afghan literature has a long and illustrious history. In Afghanistan, the ancient art of storytelling is still alive and well. They share Afghan folklore about life, culture, values, beliefs, and customs. In Afghan culture, classical poetry and plays play an essential part. Because the majority of Afghans are illiterate and unable to read or write folklores and legends are passed down the generations through songs and storytelling (Vaishali, 2016).

In *The Kite Runner*, the narrator tells his experience at the age of 12 when he betrayed his best friend. The shame of that betrayal causes him to repent for the rest of his life. The novel touches upon history. The novel has been translated into 42 languages. Many American scholars were initially reluctant to read what they considered “foreign” literature. It is clear that reading *The Kite Runner* is much more than overcoming geopolitical difficulties. The novel features the most heinous forms of religious ethnicity and racial prejudice. In this sense, Hosseini succeeded in influencing Westerners to modify their preconceived notions and views about Afghan society. The Afghan people are portrayed in *The Kite Runner* as a proud and independent people who have spent decades defending their territory against foreign invaders and internal conflict.

### **Khaled Hosseini’s Cultural and Scientific Achievements**

The narrative of the kite continued during the winter months when young boys competed in a kite fighting event. Afghanistan has a very popular kite tournament that is quite enjoyable for boys. Amir entered this tournament in an attempt to attract his father's attention and to show him that, despite his preference for reading poetry books and burying himself rather than watching football, his lack of fighting spirit and willingness to drop his head in the face of bullying from friends, does not negate a boy's ability. Hassan wanted to help Amir by being his kite runner because he had a natural disposition and a good instinct to follow a kite by feeling the wind. During the kite fighting tournament, Amir's kite was the last to take to the skies. When Amir emerged victorious from the competition, Hassan pursued the final kite that Amir had lost, but it was getting dusk and Hassan still hadn't returned home.

He kept the truth from Ali and Baba after they got home, even though his Baba was overjoyed and proud of Amir. Amir questioned whether Baba was aware of Hassan's valiant defense of Amir's kite. He wondered if Baba would become even more devoted to Hassan. Regretfully, Amir has always made an effort to avoid Hassan since that day. Amir felt uneasy with Hassan because of his guilty feelings. Ultimately, he accused Hassan and his father of robbing Amir of his possessions, which caused him to eject them from his home. When Hassan and Ali left, he tucked his watch and some cash beneath Hassan's mattress. Amir attempted to impose a condition by claiming that





Hassan had taken his money and watch. Even though Baba had promised to forgive them, Hassan and Ali departed Amir's house shortly after Hassan came clean.

Considering to classification human beings, “Marx classified human beings “into five groups” such as underclass, lower class, middle class, upper class, and “aristocracy” which Hosseini depends to upper class of society (Tyson 55). Therefore, Hosseini graduated from Independence High School in San Jose in 1984 and enrolled at Santa Clara University, where he earned a bachelor's degree in biology in 1988. The following year, he entered the University Of California San Diego School Of Medicine, where he earned his M.D. in 1993. He completed his residency in internal medicine at Cedars-Sinai Medical Center in Los Angeles in 1997. He practiced medicine for over ten years, until a year and a half after the release of *The Kite Runner*.

In 2003, Hosseini published his first novel, *The Kite Runner*, the story of a young boy, Amir, struggling to form a deeper connection with his father and coping with memories of a traumatic childhood event. The novel is set in Afghanistan, from the fall of the monarchy until the collapse of the Taliban regime, as well as in the San Francisco Bay Area, specifically in Fremont, California. The novel was the bestselling novel of 2005 in the United States, according to Nielsen BookScan. *The Kite Runner* was also produced as an audiobook read by the author. *The Kite Runner* has been adapted into a film of the same name released in December 2007. Hosseini made a cameo appearance towards the end of the movie as a bystander, when Amir buys a kite which he later flies with Sohrab.

Hosseini's second novel, *A Thousand Splendid Suns*, was published in 2007, and sensational novel is set in Afghanistan, "with a time span stretching from the second half of the twentieth century to the beginning of the twenty first century". (Al-Dagamseh, 2017). The story addresses many of the same issues as Hosseini's first novel, but from a female perspective. It follows the story of two women, Mariam and Laila, whose lives become entwined when Mariam's husband takes on Laila as a second wife. The story is set during Afghanistan's tumultuous thirty-year transition from Soviet occupation to Taliban control and post-Taliban rebuilding. The novel was released by Riverhead Books on May 22, 2007, at the same time as the Simon & Schuster audiobook. The adaptation rights of the novel were subsequently acquired by producer Scott Rudin and Columbia Pictures.

In his writings, Hosseini adjusts to the tastes of Western audiences both by using English (which is not Hosseini's native language) and by using conventional narrative techniques. As a result, his novels enjoy a considerable amount of success among a large English-speaking audience.





Hosseini's third novel *And the Mountains Echoed* were released on May 21, 2013. Prior to its release, Hosseini said: I am forever drawn to family as a recurring central theme of my writing. My earlier novels were at heart tales of fatherhood and motherhood. My new novel is a multi-generational family story as well, this time revolving around brothers and sisters, and the ways in which they love, wound, betray, honor, and sacrifice for each other." (Hosseini, 2003)

Hosseini is currently a Goodwill Envoy for the United Nations High Commissioner for Refugees (UNHCR). He has been working to provide humanitarian assistance in Afghanistan through the Khaled Hosseini Foundation. The concept for the foundation was inspired by the trip to Afghanistan that Hosseini made in 2007 with UNHCR, with the organization raising funds to build homes for refugees returning to Afghanistan.

*Sea Prayer*, an illustrated short story by Hosseini that was released in 2018, was motivated by the drowning of three-year-old Alan Kurdi, a refugee who was trying to get to Europe from Syria. Sales proceeds were donated to the Khaled Hosseini Foundation and the UNHCR.

## Result and Discussion

Examining the writer's cultural and scientific accomplishments is the aim of this study. Taking into account the literary and artistic creations of Khaled Hosseini, since it is evident that Afghanistan is a bilingual and multiethnic nation. My arguments focus on how to examine and understand the works using cultural and scientific perspectives, as well as his involvement in the establishment of this notion in society. In terms of culture, I don't dispute the idea that some of this writer's accomplishments can be set apart from others according to cultural and scientific characteristics, and that this definition—while ostensibly based on scientific observations—is true, accurate, and not too dissimilar from scientific observation. The description and analysis that follow offer a thorough rundown of viewpoints from the fields of science and culture regarding the works of Hosseini.

Hosseini writes incredibly well-crafted novels in all of their forms. Hosseini clearly loves his country and hates what has happened to it. Hosseini is succeeding in capturing moments of mild, peaceful suffering. Additionally, the novel's introduction phrases by author Khaled Hosseini are the explanation that most captivates me at the last minute: "I progressed toward becoming what I am today at twelve years old, on a freezing cloudy day in the winter of 1975." (Hosseini, 2003). Each of those items acts as a catalyst to entice me to read through all of these sections in one sitting. I am amazed by everything in this book, completely



enthralled with these volumes, and I also force myself to view most events in life through the lens of the narrative within.

Among them is Khalid Houssine, whose book *A Thousand Splendid Suns*. Khaled Houssine has been analyzing women's conditions in Afghanistan within the larger historical context of the country rather than using the ideological framework of the Taliban. According to his perspective, women are essential to the reconstruction of the Afghan nation. Resurrected renown and journalistic records of persecuted Afghan women were combined with the recycling of a familiar nineteenth-century pioneer tale of sparing ladies.

An examination of ambiguous and compassionate women's activist talks is essential at a time when the neoliberal government has been uniting itself amid the period when social resistance has moved toward becoming part of the common vocabulary and NGOs and human rights activism are working to sanction social equity. The women wearing burqas are not, in a sense, protesting the activism of Western women. Separated from the autonomous Western topic, it is a dynamic expert who asks women to recognize their core abuse. Prior to now, some scholars have discussed Afghanistan's lack of progress using traditional markers of Islamic backwardness, such as well-planned romantic relationships, calls to prayer, whiskery males, and so on. In addition to these topics, women's rights, sexual orientation, and activism have all been discussed in their writings recently.

In addition to discussing the sociopolitical conditions of Afghanistan, Khaled Houssine has gone into detail into the predicament of Afghan women. In his book *The Thousand Splendid Suns*, he describes how women in Afghanistan were forced to live behind walls during a few of the nation's attacks. (Hosseini, 2007). The personas of Mariam and Laila have brought up issues related to women's liberation and sexual value. Through a tragic turn of events, their destinies are connected. Nevertheless, women's options are limited because of their social standing in society. "Mariam needed to wed Rasheed a shoemaker who is numerous years senior to her, since her dad also; his spouses constrain her to do as such" (Hosseini, 2007). Her acknowledgement is merely a ceremonial gesture. Due to her pregnancy and being stuck, Laila, the other hero, was forced to marry Rasheed. The two situations are unworkable for her target audience.

The novel raises concerns about the rights that women were denied as well as the limitations on their freedom, decision-making, and access to education that limit their great potential in a world dominated by men. Even nevertheless, women's activist understanding reflects the emergence of a far more reticent discourse, with a distinct accent of forbearance and compassion. The scholarly community and major media have



acknowledged the shortcomings of glorious women's liberation, which has given rise to this discussion. The issue of women has gained critical attention in a variety of settings, including journalistic records, diaries, basic documentaries, literature on Muslim women, and websites of supportive societies in Afghanistan. (Jefferson, 2002).

## Conclusion

Khaled Hosseini is the narrator and primary protagonist in each of these books, however as a result of these works; there are key people who develop the story. Hosseini is the affluent guy Baba's son, and both readers and critics are drawn to his genuine writing. Its place in popular culture has been extensively written about in literature and academic research, especially in Western countries. Social psychological and social structural variables organize the events in these novels. Because of the success of her works, Hosseini was selected as a Goodwill Envoy by the UN High Commissioner for Refugees. Hosseini founded The Khaled Hosseini Foundation, a nonprofit dedicated to helping Afghans, after traveling to Afghanistan with the UNHCR. Cultural practices, scientific observation, and cultural diversity all have an impact on social structural variables. Because of their distinct religious beliefs, Afghan American novelists differ from their Western counterparts. In the meantime, a variety of societal ideas and stereotypes promote social psychological elements. One book that depicts the social changes that have occurred in Afghanistan over the past 30 years is *The Kite Runner*. Some of Khaled Hosseini's novels are regarded as exceptional and groundbreaking works in the globe because they accurately depict many concerns, which is why they have gained cultural recognition.

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## KONCHILIK SANOATI OB'YEKTLARIDA FAOLIYAT OLIB BORUVCHI XODIMLAR JISMONIY XOLATI VA SOG'LIGI HAQIDAGI AXBOROTLARNI EKVIVALENT O'ZGARTIRISH ALGORITMI

**Ilyos Ibodullayevich Kalandarov, Nodirbek Niyozovich Namozov**

Navoiy davlat konchilik va texnologiyalar universiteti,  
kalandarovilyos1987@gmail.com

**Baxriddin Nizomovich Bozorov**

Navoiy kon metallurgiya kombinati  
BN.Bozorov@ngmk.uz

### ANNOTATSIYA

Ushbu maqolada ishchilarning sog'ligi haqidagi ma'lumotlarni doimiy monitoring qilish va ish jarayonini samarali tashkil qilish maqsadida yer osti konlarida faoliyat olib boruvchi xodimlarning jismoniy holati va sog'ligi to'g'risidagi ma'lumotlarni o'zgartirishning ekvivalent algoritmi ishlab chiqilgan. Yaratilgan algoritm ishlashini ta'minlaydigan qurilmalar xodim sog'ligi haqidagi ma'lumotlarni (yurak urish tezligi, kislorod darajasi) qabul qilish va uzatish uchun mo'ljallangan individual qurilmalar va datchiklar (harorat, namlik va boshqa ma'lumotlar) yordamida atrof-muhitda bo'layotgan o'zgarishlar haqidagi ma'lumotlarni to'playdi. Algoritm ma'lumotlarni xavfsizligi va maxfiyligini ta'minlashga yo'naltirilgan bo'lib xodimlarning jismoniy holati va atrof-muhit ma'lumotlarini tahlil qilish asosida qaror qabul qilish tizimini ishlashini ta'minlaydi.

**Kalit so'zlar:** datchik, harorat, algoritm, jismoniy holat, namlik, xodimlar xavfsizligi, anomaliya, ogohlantirish tizimi, matematik model.

### ABSTRACT

In this article, an equivalent algorithm for changing the data on the physical condition and health of employees operating in underground mines was developed with the aim of constant monitoring of information about the health of workers and effective organization of the work process. The devices that ensure the operation of the created algorithm collect information about changes taking place in the environment using individual devices and datchiks (temperature, humidity and other information) designed to receive and transmit information about the health of the employee (heart rate, oxygen level). The algorithm is focused on ensuring the safety and confidentiality of data, ensuring the operation of a decision-making system based on the physical condition of employees and the analysis of environmental data.

**Keywords:** datchik, temperature, algorithm, physical condition, humidity, personnel safety, anomaly, warning system, mathematical model.



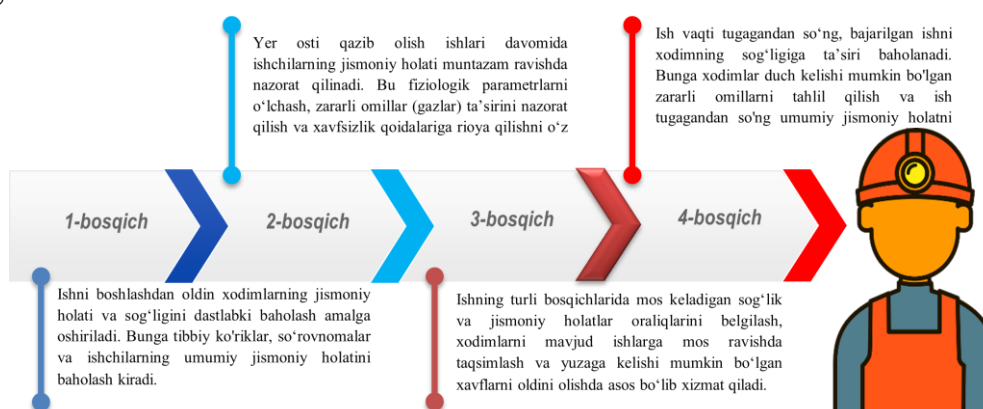
## KIRISH

Yer osti konlarida qazib olish ishlarining zamonaviy sharoitlari xodimlar jismoniy holatini monitoring qilish va xavfsizligini ta'minlashning samarali vositalarini talab qiladi [1,2]. Yer osti kon ishlarida foydali qazilmalarni ekspluatatsiya qilish ishchilarning jismoniy faolligi, vegetativ asab tizimi, nafas olish tizimi va boshqa atrof-muhit bilan bog'liq omillar inson sog'ligi uchun xavf tug'diradi [3,4]. Ushbu tadqiqotning maqsadi yer osti kon ishlarida xodimlarning jismoniy holati va sog'ligi to'g'risidagi ma'lumotlarni teng ravishda o'zgartirish algoritmini ishlab chiqishdir. Ushbu algoritm anomaliyalarni o'z vaqtida aniqlash va atrof-muhitdagi o'zgarishlarga ta'sir qilishning individual qurilmalari va datchiklar yordamida to'plangan ma'lumotlarni doimiy ravishda kuzatish va tahlil qilishga qaratilgan.

## ADABIYOTLAR TAHLILI VA METODOLOGIYA

Ushbu zamonaviy monitoring texnologiyalaridan foydalanish, ishonchli ma'lumotlarni taqdim etish uchun ekvivalent ma'lumotlarni o'zgartirishning ahamiyati asosiy jihatlarni ko'rib chiqishni taklif qiladi [5,6]. Ushbu algoritm nafaqat jismoniy holat to'g'risidagi ma'lumotlarni samarali to'plabgina qolmay, balki ularni qulay axborot ko'rinishida shakllantira oladigan, anomaliyalarni aniqlashning ishonchli mexanizmini ta'minlaydigan va yer osti konlarida ishchilarning xavfsizligi va sog'lig'ini saqlash bo'yicha tezkor tavsiyalar beradigan tizimni yaratishga qaratilgan.

Yer osti kon ishlarida xodimlarning jismoniy xolati va sog'ligi haqidagi uzluksiz axborotlarni olishda quyidagi to'rtta bosqichda amalga oshirish 1-rasmda ko'rsatilgan.



**1-rasm. Yer osti konlarida xodimlarning jismoniy xolati va sog'ligi to'g'risidagi ma'lumotlarni qabul qilish ketma-ketligi.**

**Vegetativ asab tizimi bu** – Nafas olish, yurak faoliyati, qon aylanishi, ovqat hazm qilish va boshqalar kabi avtomatik tarzda

tana funksiyalarini tartibga solib boradi. U tananing stress va tinchlanish holatlari o'rtasidagi muvozanatni ta'minlaydigan simpatik va parasimpatik bo'limlardan iborat. Vegetativ asab tizimining holati insonning fiziologik va psixologik holatiga ta'sir qilishi mumkin, bu esa o'z navbatida ishchilarning ish sharoitlariga ta'sir qilishi mumkin. Vegetativ asab tizimining faoliyatini baholash maqsadida bir qancha usullardan foydalanish mumkin. Kerdo indeksi asab tizimining faoliyatini baholash uchun ishlatiladigan ko'rsatkich bo'lib hisoblanadi. Kerdo indeks  $N_t$  quyida formula (1) bo'yicha hisoblanadi [7].

$$N_t = \left(1 - \frac{Q_b}{Y_t}\right) \cdot 100 \quad (1)$$

bu yerda  $Q_b$  — diastolik qon bosimi (mm.sim.ust),  $Y_t$  — 1 daqiqada yurak urishi tezligi (puls/min). Agar  $\frac{Q_b}{Y_t} = 1$  bo'lsa. Agar  $\frac{Q_b}{Y_t} \leq 1$  dan kichik bo'lsa  $N_t$  ijobiy natija, aks holda salbiy natijani aks etadi. Ijobiy natijalar vegetativ asab tizimining simpatik ustunlik tomon siljishini, salbiylari parasimpatik tomon siljishini anglatadi [8,9].

Kerdo indeksi vegetativ asab tizimining faoliyatini baholash ko'rsatkichlari natijasida inson organizmlarida o'zgarishlar sodir bo'lishi *1-jadvalda* keltirilgan.

*1-jadval*

Inson organizmidagi a'zolar	Simpatik tizim	Parasimpatik tizim
Ko'z qorachig'i	Kengayadi	Torayadi
Ko'z yoshi bezi	—	Ko'z yoshini (sekresiyani) kuchayishi
Og'iz bo'shlig'ida so'lak chiqaradigan bezlar.	Kam miqdordagi so'lak ajralishi	Ko'p miqdordagi so'lak ajralishi
Yurak ritmi	Kuchayadi	Kamayadi
Yurakning qisqarishi	Kuchayadi	Kamayadi
Qon tomirlari	Kuchli torayish	Ta'siri kam
Skelet mushaklari	Tonusni oshiradi	Yengil ta'sir
Nafas olish tezligi	Kuchayadi	Kamayadi
Bronxlar	Bronx to'qimalarining kengayishi	Bronx to'qimalarining torayishi
Ter bezlari	Faollashadi	—
Buyrak usti bezlari va medulla	Adrenalin va norepinefrin sekresiyasi	—
Oshqozon-ichak traktining harakatchanligi va tonusi	Keskin sekinlashadi	Faollashadi

Yer osti konlaridagi mehnat faoliyati bilan shug'ullanish jismoniy va psixologik jihatdan og'ir faoliyat bo'lib nisbatan katta kuch va tananing maxsus ish sharoitlariga moslashishini talab qiladi. Ishchilarning ishlashiga ta'sir qiluvchi asosiy omillaridan biri bu yurak-qon

tomir tizimining holati va faoliyati bo'lib hisoblanadi [10]. Yurak-qon tomir tizimi tana to'qimalarini kislorod va ozuqa moddalar bilan ta'minlashda, shuningdek haroratni tartibga solishda va metabolik mahsulotlarni yo'q qilishda muhim rol o'ynaydi. Yurak-qon tomir tizimini baholashga qaratilgan tekshiruvlar kondagi xodimlarni jismoniy mehnat bilan shug'ullangandagi holatlari haqidagi muhim axborotlarni taqdim etadi.

**Yurak-qon tomir tizimi baholashda Martine testi:** Yurak-qon tomir tizimi baholashda olib borilgan tajriba mashg'ulotida, tinch holatda insonning yurak urish tezligi ( $X_1$ ) 10 soniyada 12 pulsga teng va yuklamadan keyin ( $X_2$ ) - 20 pulsga teng bo'ldi:  $X_1 = 100\%$  deb oladigan bo'lsak ( $X_2 - X_1$ ) = 8 ga teng bo'ldi. Proporsiya orqali hisoblanganda quyidagi (2) formula kelib chiqadi [11].

$$Y = \frac{X_1 \cdot 100\%}{X_2 - X_1} = \frac{8 \cdot 100\%}{12} = 66.6\% \quad (2)$$

Mashg'ulot o'tkazilgandan keyin yurak urish tezligining oshishi 66,6% ni tashkil qildi. Yurak urish tezligining keskin oshishi inson hayotiga salbiy ta'sir ko'rsatishi oqibatida jiddiy xavflarni keltirib chiqaradi. Yurak-qon tomir tizimi bo'yicha tadqiqot natijalaridan foydalanib ishchi xodimlarni quyidagi ko'rsatkichlar asosida baholash 2-jadvalda keltirib o'tilgan.

2-jadval

O'sish %	Baholash	O'sish %	Baholash	O'sish %	Baholash
<25	5,0	50,0-55,9	3,8	80,0-84,9	2,6
25,1-29,9	4,8	56,0-60,9	3,6	85,0-89,9	2,4
25,1-34,9	4,6	61,0-65,9	3,4	90,0-94,9	2,2
35,0-39,9	4,4	66,0-70,9	3,2	95,0-99,9	2,0
40,0-44,9	4,2	71,0-74,9	3,0	100,0-104,9	1,8
45,0-49,9	4,0	75,0-79,9	2,8	105-109,9	1,6

**O'pkaning nafas olish tizimi** - bu o'pkaning nafas olish paytida havoni qabul qilish va ushlab turish qobiliyati bo'lib yer osti konlarida ishlaydigan ishchi xodimlarning jismoniy mehnatini baholashda muhim ko'rsatkichlardan biridir [12]. Yer osti konlarida faoliyat olib boruvchi nafas olish tizimida muammosi bor xodimlar ko'proq charchoqni va ish sharoitiga moslashishda qiyinchiliklarga duch kelishadi.

O'pkaning hayotiy imkoniyatlarini tushunish ishchilarning nafas olish yo'llari bilan bog'liq kasalliklari rivojlanish xavfini baholashga va profilaktika choralarini ko'rishga yordam beradi. Nafas olish tizimi orqali o'pkaning hayotiy sig'imini baholashda quyidagi (3) formuladan foydalanishimiz mumkin [13].

$$N_f = \frac{H}{M} \quad (3)$$

bu yerda  $H$  — oʻpkaning hayotiy sigʻimi (ml),  $M$  — tana massasi (kg).

Nafas olish indeksini baholashda bir qator olimlar G.Apanasenko, E.G.Milner (3a-jadval) va A.G.Xorujev (3b-jadval) lar ilmiy izlanishlar olib borishgan. Ular oʻzlarining ilmiy tadqiqotlaridan kelib chiqib nafas olish indeksini quyidagicha baholashgan [14,15].

3a-jadval

Baholash	Koʻrsatkich (ml/kg)	
	Erkaklar	Ayollar
«5»	>66	>56
«4»	61-65	51-56
«3»	56-60	46-50
«2»	51-55	41-45
«1»	<50	<40

3b-jadval

Baholash	Koʻrsatkich (ml/kg)	
	Erkaklar	Ayollar
«5»	58 va undan yuqori	38 va undan yuqori
«4»	50-57	32-37
«3»	35-49	21-31
«2»	27-34	15-20
«1»	26 va undan past	14 va undan past

**Jismoniy holat koʻrsatkichi.** Yer osti kon ishchi xodimlarining jismoniy holat koʻrsatkichlari mehnat faoliyatiga va baxtsiz xodisalarni roʻy berishiga sezilarli taʼsir koʻrsatadi. Ushbu koʻrsatkichlarni baholash va monitoringini olib borish yer osti kon ishchilarning mehnat faoliyati, sogʻligʻi va xavfsizligini taʼminlash uchun muhim omil boʻlib hisoblanadi.

Jismoniy holat darajasini hisoblash boʻyicha S.N.Blinkov, A.F.Bashmak, V.A.Mezenseva va S.E.Borodachevalar ilmiy izlanishlar olib borishgan. Ular oʻzlarining maqolalarida jismoniy holat darajasini quyidagicha (4) baholash mumkinligini koʻrsatib oʻtishgan [16].

$$J_h = \frac{(700 - 3 \cdot X - 2,5 \cdot Q_{o'rt} - 2,7 \cdot B + 0,28 \cdot M)}{(350 - 2,6 \cdot B + 0,21 \cdot P)} \quad (4)$$

bu yerda  $J_h$  — Jismoniy holat indeksi,  $X$  — Yurak urish tezligi (puls/min),  $B$  — yoshi,  $M$  — tana vazni (kg),  $P$  — tik turgandagi boʻyi (sm),  $Q_{o'rt}$  — oʻrtacha qon bosimi (mm.sim.ust).

$Q_{o'rt}$  — oʻrtacha qon bosimi quyidagi formula asosida topiladi (5)

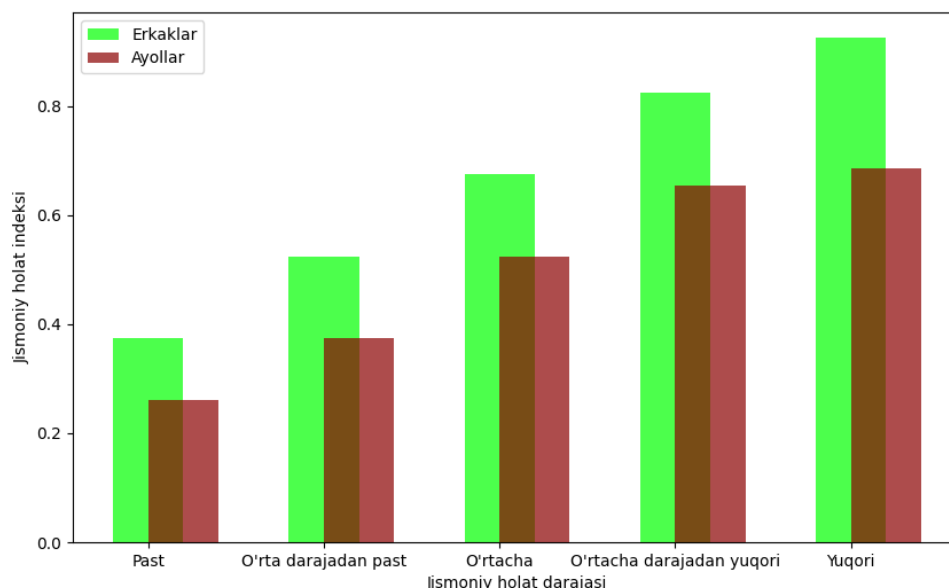
$$Q_{o'rt} = Q_b + \frac{1}{3}(Q_{sb} - Q_b) \quad (5)$$

bu yerda  $Q_{sb}$  — sistolik qon bosimi (mm.sim.ust),  $Q_b$  — diastolik qon bosimi (mm.sim.ust),

E.A.Pirogov jismoniy holat darajasini baholashda xodimlarni ayollar va erkaklarga ajratib quyidagicha (4-jadval) baholagan [17].

4-jadval

Jismoniy holat darajasi	Jismoniy holat indeksi diapazoni	
	Ayollar uchun	Erkaklar uchun
Past	0,260 va undan kam	0,375 va undan kam
O'rtacha darajadan past	0,261 dan 0,375 gacha	0,376 dan 0,525 gacha
O'rta	0,376 dan 0,525 gacha	0,526 dan 0,675 gacha
O'rtacha darajadan yuqori	0,526 dan 0,675 gacha	0,676 dan 0,825 gacha
Yuqori	0,676 va undan ko'p	0,826 va undan ko'p



2-rasm. Ayollar va erkaklarning jismoniy holat darajasini baholash diagrammasi

## NATIJALAR

Yer osti konlarida faoliyat olib boruvchi xodimlar sog'ligi to'g'risidagi ma'lumotlarni muntazam ravishda monitoring qilib borish xodimlarning xavfsizligi va sog'ligiga haqida qayg'urishning muhim jihati bo'lib hisoblanadi. Biz yuqoridagi ko'rsatkichlardan foydalangan holda Python dasturlash tilidan foydalanib, yer osti konlarida faoliyat olib boruvchi xodimlar sog'ligi haqidagi ma'lumotlar ko'rsatkichlarini olishimiz mumkin.

Bu tadqiqot orqali xodimlar orasidan biror xodimning sog'ligida (yurak urishining o'zgarishi, qon bosimini oshishi, nafas olish tizimini yamonlashishi) kabi o'zgarishlarni va shaxtadagi zaharli gazlarning miqdori, harorati, namligi qayd etilgan ko'rsatkichlarni

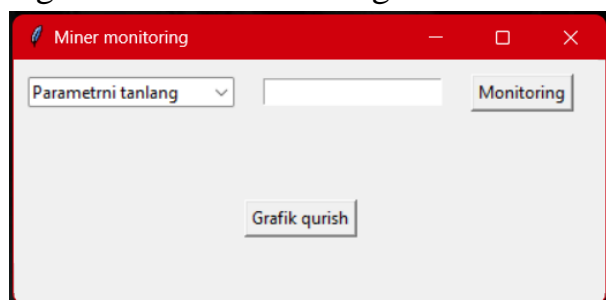


bir vaqtda olishimiz mumkin. Inson salomatligini belgilovchi me'yoriy ko'rsatkichlar 5-jadvalda berilgan.

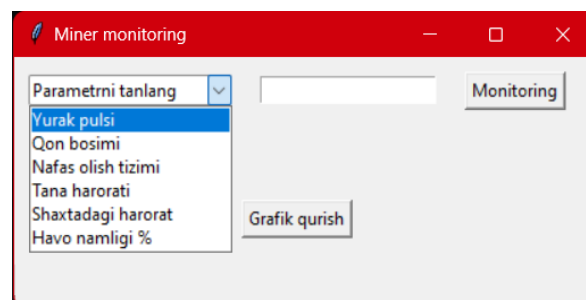
5-jadval

Ko'rsatkichlar	Me'yor	Me'yordan yuqori
Yurak urish tezligi	60-80 puls/min	95 va undan yuqori
Qon bosimi	120/80 (mm.sim.ust)	120/80 (mm.sim.ust)
Tana harorati	36.6 <sup>0</sup> C	37.6 <sup>0</sup> C
Shaxtadagi harorat	18-25 <sup>0</sup> C	35 <sup>0</sup> C va undan yuqori
Havo namligi	30-60 %	30-60 %

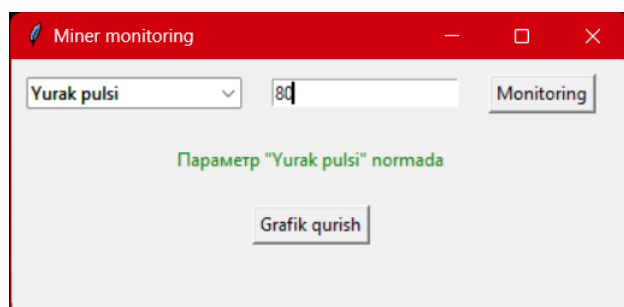
Ushbu tadqiqot asosidagi natijalardan foydalanib dastur ishlashi uchun xodimlardan (yurak urishining o'zgarishi, qon bosimi) va shaxtadagi o'zgarishlardan (zaharli gazlarning miqdori, harorati, havo namligi kabi ko'rsatkichlari) uzluksiz axborot kelib turibdi deb hisoblaymiz. Dastur ishga tushganda quyidagi oyna (3a-rasm) ekranga chiqadi. Parametrlarni tanlang bo'limidan (3b-rasm) kerakli parametrni tanlaymiz. Agar qabul qilingan axborotlar (5-jadval) me'yorlariga javob bersa, natija 3c-rasmga ko'rsatilgandek aks etadi. Real vaqt rejimida xodimning sog'ligida biror o'zgarish (anomaliya) sodir bo'lsa o'sha vaqtda dastur oynasida ogohlantiruvchi signal (3d -rasm) paydo bo'ladi. Tadqiqot natijalari asosidagi dastur algoritmi 4-rasmga berilgan.



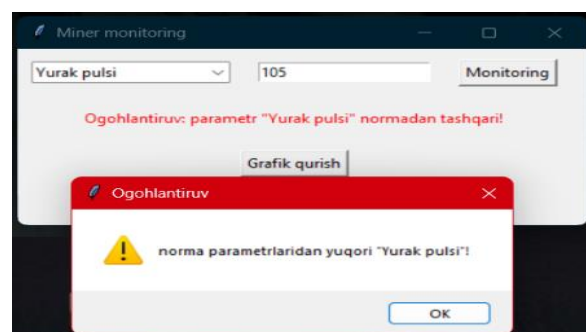
3a-rasm



3b-rasm

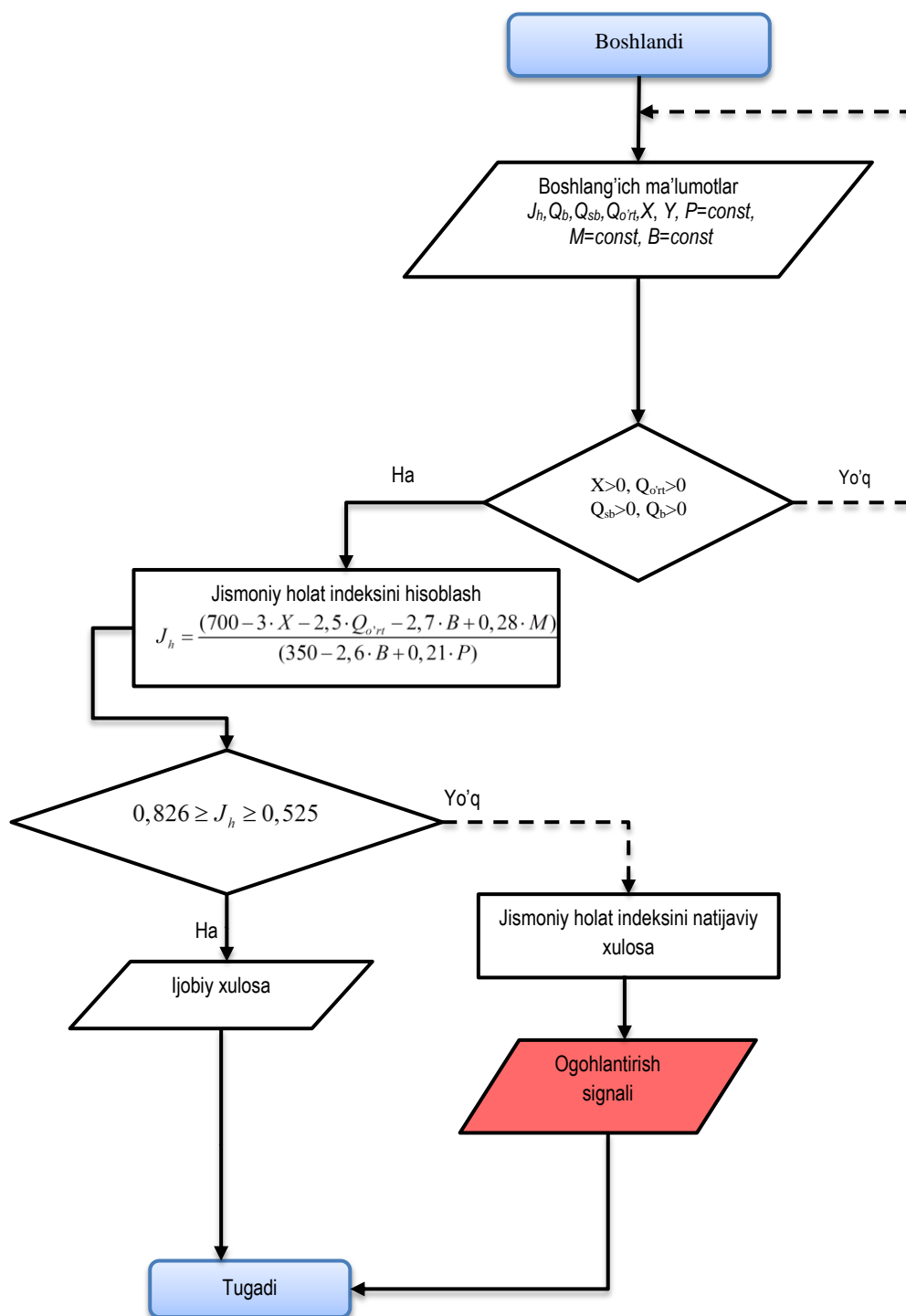


3c-rasm



3d-rasm

3-rasm. Miner monitoring dasturining ishchi oynasining umumiy ko'rinishi.



**4-rasm. Yer osti kon ishlarida xodimlarn jismoniy xolati va sog'ligi haqidagi axborotlarni qabul qilish, qayta ishlash va tahlil qilish algoritm blok-chizmasi**

### MUHOKAMA

Konchilik sanoati ob'ektlarida faoliyat olib boruvchi xodimlarning jismoniy holati va sog'ligi haqidagi axborotlarni ekvivalent o'zgartirish algoritmini muhokama qilishda bir qancha muhim jihatlarni ko'rib chiqish kerak. Bunday algoritm, odatda, ma'lumotlarni himoya

qilish, real vaqtda kuzatish, tahlil qilish, va sog'liqni saqlash sohasida samarali qarorlar qabul qilish uchun ishlatiladi.

Xodimlarning jismoniy holatini kuzatish uchun turli xil datchiklar va qurilmalar (masalan, yurak urishi, qon bosimi, va harorat datchiklari) ishlatiladi. Jismoniy holat va sog'liqni o'lchash uchun turli xil ma'lumotlar turkumlari yig'iladi. Masalan, fiziologik ko'rsatkichlar, harakat faolligi, va sog'liq haqidagi umumiy ma'lumotlar kiradi.

Ma'lumotlarni qayta ishlashda datchiklardan olingan ma'lumotlar to'g'ri bo'lishi uchun avval normalizatsiya va filtratsiya jarayonidan o'tkaziladi.

Ma'lumotlarni tahlil qilishda statistik tahlil, o'qitish algoritmi, prognozlash metodlaridan foydalanish

- Statistik tahlil Jismoniy holat va sog'liq bo'yicha umumiy statistik ko'rsatkichlarni hisoblash.

- O'qitish algoritmlari Ma'lumotlarni o'rganish uchun sun'iy intellekt va mashinaviy o'qitish algoritmlaridan foydalanish.

- Prognozlash Xodimlarning jismoniy holati va sog'liq darajasini prognoz qilish mumkin.

Bu jarayonlarni amalga oshirish uchun maxsus dasturiy ta'minotlar va algoritmlar ishlab chiqish talab qilinadi. Algoritmning muvaffaqiyati, asosan, datchiklarning aniqligi, ma'lumotlarni to'g'ri qayta ishlash, va tahlil qilish imkoniyatlariga bog'liq.

## XULOSA

Ishlab chiqilgan algoritm yer osti konlarida ishchilarning salomatligi va xavfsizligini ta'minlashda muhim qadam bo'lib ma'lumotlarni yig'ish, uzatish, qayta ishlash, tahlil qilish va qaror qabul qilish bosqichlarini o'z ichiga oladi. Taklif qilinayotgan algoritmning muhim elementi ma'lumotlardagi anomaliyalarni aniqlash bo'lib xodimlarning jismoniy holatidagi o'zgarishlarga tezda javob berishga imkon beradi. Anomaliyalar aniqlanganda, ogohlantirish tizimi faollashadi, xodimlar va rahbariyat uchun tavsiyalar beriladi shuningdek, sog'likga ta'sir qiluvchi omillarning oldini olish maqsadida atrof-muhitni kuzatish va nazorat qilish mumkin bo'lgan ko'rsatkichlarni boshqarish choralari qo'llaniladi. Olib borilgan tadqiqot ishida shaxta xodimlarning jismoniy holati va sog'lig'i to'g'risidagi ma'lumotlarni ba'zilar hisobga olingan. Miner monitoring dasturida ishchi xodimlarning ID raqami, shaxtadagi joylashuv tizimi kabi ishlar ko'rilmagan bo'lib keyingi tadqiqot ishlarida e'tiborga olinadi.

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## ПРИМЕНЕНИЕ ТЕХНИЧЕСКОГО УГЛЕРОДА ТУ-90 В КАЧЕСТВЕ КРАСКИ

**Носир Тожимуродович Ортиков**

старший научный сотрудник д-р. тех. PhD

Ташкентский научно-исследовательский институт химических технологий

**Масъуд Убайдулла ўғли Каримов**

Заместитель директора по научной работе, д.т.н., проф.

Ташкентский научно-исследовательский институт химических технологий

**Абдулахат Турапович Джалилов**

директор д.х.н., проф. академик, УзРФА,

Ташкентский научно-исследовательский институт химических технологий

### АННОТАЦИЯ

Для получения технического углерода путем переработки сажи, образующейся при производстве ацетилена, первоначально полученную отходную сажу смешивают с водой в соотношении 1:3 и очищают продукт от технических элементов. Очищенный продукт переводят в водный раствор ионов различных металлов 5%-ой серной кислотой и отделяют от низкомолекулярных веществ добавлением 0,1% ПАВ по отношению к сухой массе. Отделившуюся от раствора сухую массу сушат и измельчают в сушильном шкафу при температуре 110°C, таким образом получают новый технический углерод марки ТУ-90. Определены концентрация полученного технического углерода на аппарате Malvern Instruments 0,0002%, однородность 2,860, удельная поверхность 2362 м<sup>2</sup>/кг и зависимость общей плотности от размера частиц.

**Ключевые слова:** ТУ-90, серная кислота, ПАВ, Malvern Instrument, общая плотность.

### ВВЕДЕНИЕ

Сегодня спектр областей использования технических углеродов расширяется с каждым днем. Технический углерод (ТУ) является одним из наиболее производимых углеродных наноструктурированных материалов, около 90% его используется в качестве пигмента в резиновых пластмассах, в качестве армирования, наполнителя и во многих отраслях промышленного хозяйства. Техническая



морфология углерода — это наука о структуре и форме. Для описания сложной структуры технического углерода, частиц, агрегатов и агломератов используются три термина. Частицы являются основными элементами агрегата. Эти почти сферические частицы соединяются вместе, образуя агрегаты. Частицы отделяются от агрегата только при его разрушении. Отдельные частицы, не агрегированные, встречаются только в термическом углероде. Размер частиц является важнейшим свойством технического углерода. Армирующий эффект технического углерода в эластомерах, способность придавать цвет лакокрасочным материалам, защитный эффект от ультрафиолетового излучения в пластмассах во многом зависят от размера частиц. Чем меньше размер частиц, тем более выражены все эти факторы. Частицы технического углерода настолько малы, что их невозможно увидеть в обычный оптический микроскоп. Нижний предел зрения оптических микроскопов составляет 0,7 микрометра (мкм) или 700 нм (нанометров). Размер частиц наиболее распространенных видов технического углерода находится в пределах 13 – 120 нм. Сами единицы измерения ( $1 \text{ нм} = 10^{-9} \text{ м}$ ) показывают, насколько малы частицы технического углерода. Для визуализации размера частиц технического углерода используется следующее сравнение: частица размером 13 нм размером с футбольный мяч [1]. Иногда размер частиц указывают в ангстремах ( $1 \text{ \AA} = 10^{-10} \text{ м}$ ). В литературе предыдущих лет размеры частиц выражались в миллимикронах (мм). Миллимикрон, как и нанометр, равен  $10^{-9} \text{ м}$ . Ангстремы и миллимикроны не являются систематическими единицами, но они используются в технической литературе по углероду для описания размера частиц и кристаллитов, из которых эти частицы образуются [2].

По современным представлениям частицы дисперсных видов технического углерода относятся к наночастицам - классу частиц от 1 до 100 нм ( $0,001 - 0,1 \text{ мкм}$  или  $10^{-7} - 10^{-5} \text{ см}$ ). Для измерения таких мелких частиц используется электронная микроскопия. Диаметры частиц технического углерода определены с помощью электронного микроскопа. Поскольку технический углерод – полидисперсный материал, на одном уровне находятся частицы разного размера [3]. В зависимости от количества измеряемых частиц и их диаметра определяют средний диаметр частиц. Средний диаметр частиц является одним из важнейших свойств технического углерода. Каждая марка технического углерода характеризуется определенным средним диаметром частиц [4]. В настоящее время большая часть технического углерода, используемого в промышленности, импортируется, что наносит большой экономический ущерб. Получение

технического углерода из местного сырья достигается за счет переработки местного сырья и происходит экономия иностранной валюты [5].

### ЭКСПЕРИМЕНТАЛЬНАЯ ЧАСТЬ:

Для получения технического углерода путем переработки сажи, образующейся при производстве ацетиленов на АО «Навоиазот», первоначально полученную отходную сажу смешивают с водой в соотношении 1:3 и производят очистку продукта от технических элементов. Очищенный продукт переводят в водный раствор ионов различных металлов с 5%-ной серной кислотой и отделяют от низкомолекулярных веществ добавлением 0,1% ПАВ по отношению к сухой массе. Выделенную из раствора сухую массу сушили и измельчали в сушильном шкафу при температуре 110°C, таким образом был получен новый технический углерод марки ТУ-90.

### РЕЗУЛЬТАТ И ЕГО ОБСУЖДЕНИЕ:

Цветовые показатели, размер частиц, однородность технического углерода, полученного данным методом, анализировались на аппарате Malvern Instruments на СП «UzAuto Cepla». Результаты анализа показывают, что концентрация составляет 0,0002%, Span 10,222, однородность 2,860, удельная поверхность 2362 м<sup>2</sup>/кг, D(3;2) 2,54 мкм, D(4;3) 26,0 мкм, Dv(10) 0,871 мкм, Dv(50) 8,12 мкм, Dv(90) 83,8 мкм.

Таблица 1

Результаты анализа, полученные на приборе Malvern Instrument

Размер (µm)	Объём (%)	Размер (µm)	Объём (%)	Размер (µm)	Объём (%)	Размер (µm)	Объём (%)	Размер (µm)	Объём (%)	Размер (µm)	Объём (%)	Размер (µm)	Объём (%)	Размер (µm)	Объём (%)
0,0100	0,00	0,0597	0,00	0,357	0,64	2,13	2,25	12,7	2,28	76,0	2,38	454	0,00	2710	0,00
0,0114	0,00	0,0679	0,00	0,405	0,83	2,42	2,25	14,5	2,27	86,4	2,34	516	0,00	3080	0,00
0,0129	0,00	0,0771	0,00	0,460	1,03	2,75	2,27	16,4	2,25	98,1	2,19	586	0,00	3500	
0,0147	0,00	0,0876	0,00	0,523	1,24	3,12	2,30	18,7	2,22	111	1,89	666	0,00		
0,0167	0,00	0,0995	0,00	0,594	1,45	3,55	2,34	21,2	2,17	127	1,46	756	0,00		
0,0189	0,00	0,113	0,00	0,675	1,66	4,03	2,38	24,1	2,09	144	0,96	859	0,00		
0,021	0,00	0,128	0,00	0,767	1,84	4,58	2,41	27,4	2,02	163	0,48	976	0,00		
0,0244	0,00	0,146	0,00	0,872	2,00	5,21	2,43	31,1	1,97	186	0,13	1110	0,00		
0,0278	0,00	0,166	0,00	0,991	0,00	5,92	2,42	35,3	1,95	211	0,00	1260	0,00		
0,0315	0,00	0,188	0,00	1,13	2,21	6,72	2,40	40,1	1,98	240	0,00	1430	0,00		

0,0358	0,00	0,214	0,00	1,28	2,26	7,64	2,37	45,6	2,05	272	0,00	1630	0,00	
0,0407	0,00	0,243	0,00	1,45	2,28	8,68	2,34	51,8	2,14	310	0,00	1850	0,00	
0,0463	0,00	0,276	0,00	1,65	2,28	9,86	2,31	58,9	2,25	352	0,00	2100	0,00	
0,0526	0,00	0,314	0,00	1,88	2,26	11,2	2,29	66,9	2,34	400	0,00	2390	0,00	

По результатам анализа размера частиц также была представлена диаграмма зависимости общей плотности от размера частиц.

#### Зависимость общей плотности от размера частиц

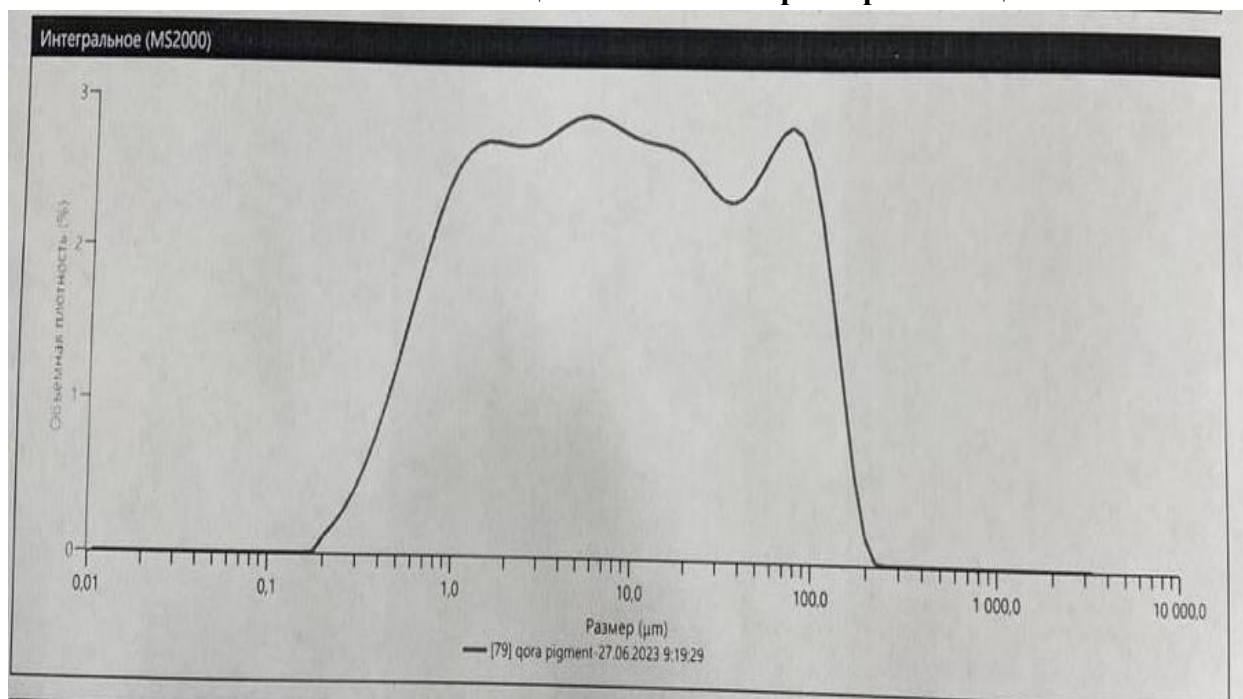


Рисунок 1. Зависимость общей плотности от размера частиц.

На этой диаграмме представлены общая плотность от 0 до 3%, размер частиц от 0,01 мкм до 10000,0.

#### Пробные образцы



Образец черной краски ТУ-90



Образец неокрашенный краской и образец окрашенный краской ТУ-90

Рисунок 2. Результаты применения образца краски ТУ-90 по металлам.

На основе образца ТУ-90 был приготовлен образец краски и изучены результаты ее применения по металлам на предмет соответствия техническим требованиям.

## ЗАКЛЮЧЕНИЕ

По полученным результатам проведенных исследований в лаборатории видно, что технический углерод марки ТУ-90, полученный данным методом, превосходит технический углерод марки ВК 354.

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## FUQAROLIK JAMIYATI INSTITUTLARINING MILLIY VA ETNIK ZIDDIYATLARNI OLDINI OLISHDAGI ROLI

**Yunusjon Axmedov**

O'zbekiston Respublikasi Davlat xavfsizlik xizmati

“Temurbeklar maktabi” harbiy-akademik litseyi o'qituvchisi, Strategik tahlil va istiqbolni  
belgilash oliy maktabi mustaqil tadqiqotchisi

[akhmedov.yunusjon2301@gmail.com](mailto:akhmedov.yunusjon2301@gmail.com)

### ANNOTATSIYA

Milliy va etnik ziddiyatlar o'zining xavfliligi nuqtai nazaridan biror bir urushlardan kam emas. Bunday ziddiyatlar globallashuv sharoitida yangicha xususiyatlarda namoyon bo'lib davlatlar, mintaqalar va xalqlarning hayotini izdan chiqarmoqda. Polietnik davlatlarda milliy va etnik ziddiyatlarni oldini olish, ularning darajasini pasaytirish, qarama-qarshi tomonlarning o'rtasida muloqot muhitini yuzaga keltirishda bor kuch va imkoniyatlardan foydalanilib usul va vositalar ishga solinmoqda. Ayniqsa xalqaro va milliy darajadagi fuqarolik jamiyati institutlari bo'lgan nodavlat, notijorat tashkilotlarning bunday ziddiyatlarni profilaktikasi, ularni to'xtatish, keskinlik darajasini pasaytirishga qaratilgan turli faoliyatlari sezilarli natijalarga olib kelmoqda. Bunday tashkilotlarni faoliyatini o'rganish, ularning tajribalarini zarur hollarda qo'llab ko'rishga intilish polietnik mamlakatlar uchun zarur.

**Kalit so'zlar:** globallashuv, milliy ziddiyatlar, etnik ziddiyatlar, fuqarolik jamiyati institutlari, nodavlat tashkilotlar, notijorat tashkilotlar, polietnik mamlakatlar, millatlararo ziddiyatlar.

### ABSTRACT

Conflicts on national and ethnic grounds are no less dangerous than wars. Such conflicts are manifesting in new features in the conditions of globalization and disrupting the life of states, regions and peoples. In polyethnic states, all efforts and opportunities are being used to prevent national and ethnic conflicts, to reduce their level, to create an atmosphere of dialogue between the opposite parties, and methods and tools are being used. In particular, various activities of non-governmental, non-profit organizations, which are institutions of civil society at the international and national levels, aimed at preventing such conflicts, stopping them, and reducing the level of tension, are bringing significant results. It is necessary for multi-ethnic countries to study the activities of such organizations and try to support their experiences in necessary cases.

**Keywords:** globalization, national conflicts, ethnic conflicts, civil society institutions, non-governmental organizations, non-profit organizations, polyethnic countries, inter-ethnic conflicts.

## KIRISH

Etnosiyosiy jarayonlarni o'rganish – zamonaviy dunyoda ro'y berayotgan ijtimoiy-siyosiy o'zgarishlarni tahlil qilishning asosiy yo'nalishi hisoblanadi. Mutaxassislarning fikricha dunyo millatchilikning “renessansi”ni boshdan kechirmoqdaki, “chegarasiz dunyo” siyosatini targ'ib qilayotgan globalistlar uchun kishilar ongi va siyosatdagi o'ziga xos burilish “globallashuv paradoksi” deb baholanmoqda. Global rivojlanish paradigmasi o'zgarib insoniyat ro'baro' bolishi mumkin bo'lgan yirik muammolardan tashqari, qadriyatlar, axloqiy me'yorlar darajasidagi muammolarni yechimi uchun javob izlash dolzarblashib bormoqda. Mana shunday qiyin sharoitda milliy va etnik munosabatlar sohasi tashqi bosimlar va siyosiy manipulyatsiya uchun eng zaif sohaga aylanib qoldi. Natijada globallashuv davlatlar va xalqlar o'rtasidagi iqtisodiy va siyosiy to'siqlarni bartaraf etayotgan bir sharoitda milliy va etnik xarakterdagi ziddiyatlar dunyoning turli mintaqalarida o'ziga xos rangbaranglikda namoyon bo'lmoqda. Ziddiyatlar esa davlatlar, mintaqalar, xalqlar va hatto sivilizatsiyalar o'rtasidagi munosabatlarni keskinlashuvini yuzaga keltirmoqda. Bunday sharoitda milliy va etnik xarakterga ega bo'lgan ziddiyatlar polietnik davlatlarning hududiy yaxlitligiga xavf solishdan tashqari ularning geosiyosiy maydondagi imkoniyatlarini ham pasaytirib yubormoqda. Iqtisodiy hukmronlik maqsadidagi geosiyosiy kuchlarni polietnik davlatlarning eng “nozik nuqtasi”ga ta'sir o'tkazish orqali raqibni muayyan talablarga “rozi”ligini olish tajribasi shakllanib bormoqda. Shuning uchun globallashgan dunyoda polietnik mamlakatlar o'zlarining milliy-hududiy yaxlitligi, siyosiy barqarorligini saqlab qolish maqsadida milliy va etnosiyosiy ziddiyatlarni oldini olish, ularning keskinligini yumshatish profilaktikasini kuchaytirishga qaratilgan turli vositalarni ishga solishmoqda. Ular qo'llayotgan tajribalar hamma vaqt ham milliy va etnik barqarorlikni saqlab qolishning kafolatlangan sharti bo'lmasligi mumkin, lekin muayyan darajada erishilgan yutuqlarini o'rganish, zaruriy hollarda qo'llab ko'rish foydadan xoli bo'lmaydi.

## ADABIYOTLAR TAHLILI VA METODOLOGIYA

Ma'lumki, demokratik xarakterdagi davlatlarning deyarli barchasida fuqarolik jamiyatining institutlari davlat hayotidagi ijtimoiy, iqtisodiy, huquqiy va hatto siyosiy masalalarni hal etishda arzirli kuchga aylanib bormoqda. Ularning faolligi ortidan davlat qator

muammolarni fuqarolarning ongli uyushmalariga tayangan holda yechimini topishga muvaffaq bo‘lmoqda, aniqrog‘i bunday institutlarning amal qilishiga munosib shart-sharoitlarni yaratish orqali o‘zining majburiyatlarini bir qismini ma’lum ma’noda ularning yelkasiga “yuklamoqda”. Ongli ravishda birlashgan faol fuqarolarning uyushmalari jamiyat taraqqiyoti, fuqarolar o‘rtasidagi hamjihatlikka raxna soladigan, qonunlarni buzilishini oldini oladigan xilma-xil muammolarga qarshi kurashish uchun tayyor turgan malakatlarda hokimiyat bunday institutlarni amal qilishiga qulay imkoniyatlarni yaratib beradi. Savol kelib chiqadi, polietnik mamlakatlarda milliy va etnik ziddiyatlarning profilaktikasi, ularni destruktiv ta’sirini pasaytirish uchun fuqarolik jamiyatining institutlarini jalb qilsa bo‘ladimi? Qator polietnik mamlakatlarning tajribasiga e’tibor berilsa savolga ijobiy javob olsa bo‘ladi.

Polietnik mamlakatlardagi milliy va etnik munosabatlar keskin fazaga kirishganda bunday munosabat subyektlari hokimiyat tomonidan qabul qilinadigan qarorlarga hamma vaqt ham xayrixoh bo‘lmaydilar. Shuning uchun ziddiyatlar keskin tus olmasidan ularni ilmiy o‘rganish, profilaktikasiga jiddiy yondoshish oqibatlarni halokatli bo‘lishini oldini oladi. Aynan etno-siyosiy va milliy ziddiyatlarni oldini olishga fuqarolik jamiyati institutlarini kuchini safarbar etish tajribasi qator mamlakatlarda ommalashmoqda.

Fuqarolik jamiyati institutlarining davlatlar milliy xavfsizligiga tahdidlar paydo bo‘lganda real imkoniyatlari beqiyos bo‘lishi mumkinligiga misolni yaqin o‘tmishdan olsak maqsadga muvofiq bo‘ladi. 2011-yili boshlangan “Arab bahori”nomini olgan siyosiy jarayonlarning beshigi Shimoliy Afrikadagi Tunisda vujudga keldi. Bu yerda amalga oshgan “Yasmin inqilobi”dan keyin mamlakat fuqarolik urushi bo‘lag‘asiga kelib qoladi. Tarkibiga Umumtunis mehnat konfederatsiyasi, Tunis sanoat, savdo va hunarmandchilik konfederatsiyasi, Tunis Inson huquqlarini himoya qilish ligasi, Tunis advokatlar ordeni kabi fuqarolik jamiyati institutlari Tunis milliy muloqot Kvartetiga birlashdi. Kvartet yuqorida nomi keltirilgan to‘rtta jamoat tashkilotlarining birlashuvi natijasida 2013-yilda yuzaga keladi. Siyosiy larzalarni boshdan kechirib fuqarolik urushi bo‘lag‘asiga kelib qolgan mamlakatda qarama-qarshi tomonlarni muzokara stoliga keltirish, tinchlikka erishishning muqobil variantlarini qo‘llagan Tunis kvarteti 2015 yili tinchlik sohasidagi Nobel mukofotiga loyiq deb topilgan edi. Tunisdagi mavjud holatni risoladagiday deb bo‘lmaydi, lekin “Arab bahori”ni boshdan



kechirgan uning qo'shnilari va Yaqin Sharq mamlakatlaridagidan bu yerdagi holat ancha ijobiy sanaladi. Muhimi, fuqarolik jamiyati institutlari ulkan ijtimoiy-siyosiy fojiani oldini olishga muvaffaq bo'lgan.

Etnokonfessional, etno-milliy munosabatlar keskin bo'lishi xavfi bor mamlakatlarda fuqarolik jamiyati institutlarini rolini oshirish orqali jamiyatda muloqot muhitini yuzaga keltirish, milliy, diniy, etnik ziddiyatlarni profilaktikasini samarali amalga oshirish imkoniyati mavjudligini yana boshqa misollar orqali ham ko'rish mumkin. Dunyoning ko'plab mintaqalarida kelib chiqqan milliy-etnik nizolarni hal etishda xalqaro nodavlat tashkilotlardan tortib to lokal nodavlat va notijorat tashkilotlarining muayyan rolini ko'rishimiz mumkin.

## MUHOKAMA VA NATIJALAR

Tog'li Qorabog'dagi arman-ozarbayjon, Dnestrboyidagi rusiyzabon aholi va moldavanlar, Bosniya va Gersegovinadagi serblar va bosniyaliklar, Ukrainaning janubi-sharqidagi, Janubiy Osetiya, Abxaziyadagi etno-siyosiy ziddiyatlarga jahon jamoatchiligi e'tiborini tortish, bu hududlardagi real ziddiyatlarning xavfi, oqibatlari, ularni yumshatishga oid takliflarni ishlab chiqishda Karnegi fondini ta'siri kuchli bo'lgan. Bu xalqaro fond asosan konfliktogen xarakterdagi davlatlararo munosabatlarga oid ma'ruzalar tayyorlasada, milliy va etnik ziddiyatlarni yumshatishga, qarama-qarshi tomonlarni muzokara stoliga da'vat etishda ta'sir kuchi nihoyatda kuchli desak xato bo'lmaydi.

Nodavlat va notijorat xarakterdagi tashkilotlarning etnik ozchilik huquqlarini himoya qilishga oid shunday ishlariga guvoh bo'lish mumkinki, bunday institutlarni tashkil qilish, ularni qo'llab-quvvatlash orqali juda ko'p muammolarni hal qilish mumkinligiga ishonch hosil bo'ladi. XX asr 90-yillarida Yevropa lo'lilar huquqlarini himoya qilish bo'yicha markazi tashkil etilgan edi. Xalqaro jamoat tashkiloti sifatida markaz mintaqadagi davlatlarda lo'lilar huquqlarini himoya qilish boyicha vaziyatni monitoringini olib boradi, ularning huquqlari buzilgan sharoitda yuridik himoyani tashkil etadi. Tashkilotning say'-harakatlari bilan lo'lilar etnik guruhi vakillariga nisbatan zo'ravonlik va nafrat, ta'limda segregatsiya, majburan ko'chirish va sterilizatsiya holatlari aniqlangan. Tashkilot bergan ma'lumotlarga ko'ra Bolgariya, Vengriya, Slovakiya,



Chexiya kabi Yevropa mamlakatlarida odam savdosi qurbonlarining 70-80 foizi lo‘lilar hissasiga to‘g‘ri keladi.

Shunday holatlar bo‘lganki milliy va etnik xarakterdagi ziddiyatlarni oldini olishda obro‘-e‘tiborga ega alohida shaxslar ham muhim rol o‘ynashgan. 1993 yili Burundida boshlangan tutsi va xutu etnik guruhlarlari ortasidagi fuqarolik urushini to‘xtatishda Janubiy Afrika Respublikasi sobiq prezidenti Nelson Mandelaning tomonlar o‘rtasida muloqotni tiklashdagi roli beqiyos bo‘lgan. 2005 yili “Inqirozlarni oldini olish bo‘yicha tashabbus” nomli nodavlat tashkiloti Finlyandiyaning sobiq prezidenti Martti Axtisaari boshchiligidagi Indoneziya hukumati va Achex viloyatidagi separatistlar o‘rtasida tinchlik shartnomasini imzolanishi natijasida o‘ttiz yil davom etgan urushga yakun yasashga muvaffaq bo‘lindi.

Postsovet mintaqadagi deyarli barcha respublikalar ittifoq parchalangach turli fazada amal qiladigan milliy-etnik ziddiyatlarni boshidan kechirishdi, ularning asorati hamon seziladi. Ba‘zilar hozir faol ko‘rinishda namoyon bo‘layotgan bo‘lsa, ayrimlari latent fazaga tushgan. Rossiya Federatsiyasi ham sobiq ittifoq parchalanishidan keyin milliy va etnik konfliktlarni turli darajada boshidan kechirdi, bu jarayon hamon davom etmoqda. Bu davlatning milliy va etnik rang barangligini alohida fenomen desa bo‘ladi. Mamlakatda konfliktogen mintaqalar juda ko‘p bo‘lgani, bu holat mamlakatning milliy xavfsizligini shubha ostida qoldirishi mumkinligini anglagan hukumatning milliy siyosatida nodavlat, notijorat tashkilotlarni lokal va federativ subyektlar o‘rtasidagi milliy va etnik nizolarni profilaktikasi, ularni fonini pasaytirish, turli milliy va etnik guruhlar o‘rtasidagi milliy muloqotni yuzaga keltirish ishiga jalb qilishga alohida e‘tibor beriladi. Fuqarolik jamiyati institutlarining aynan milliy va etnik nizolarni oldini olishga qaratilgan maqsadlarini davlat qo‘llab-quvvatlaydi, ular bilan hamkorlik qiladi, ularning faoliyati uchun munosib shart-sharoitlarni yaratib beradi.

Mamlakatda milliy va etnik ziddiyatlarni oldini olishga qaratilgan nodavlat, notijorat tashkilotlarining faoliyat yo‘nalishlari rang-barang bo‘lib, ular migrantlar huquqlarini himoya qilishdan tortib to kamsonli millatlarning etnomadaniy yutuqlarini targ‘ibotigacha yo‘naltirilgan. Masalan, “Ryazan mediatsiya va huquq” muxtor notijorat tashkiloti millatlararo munosabatlarni tartibga solish, ziddiyatlarni oldini olish bo‘yicha o‘ta foydali uslubiy qo‘llanmalarni ishlab chiqishga, lokal xarakterdagi



milliy va etnik nizolarni oldini olish, ularni kelib chiqishi mumkinligini aniqlash bo'yicha faol ishlarni yo'lga qo'ygan. Markaz lokal xarakterdagi milliy ziddiyatlarni kelib chiqishini til-madaniy, etnodemografik, ijtimoiy-iqtisodiy, tarixiy, diniy-konfessional sabablarini ham jiddiy tadqiq qilish ishiga e'tibor beradi, shunday ziddiyatlarni monitoringini olib boradi.

Rossiya Federatsiyasining turli mintaqalarida milliy va etnik nizolarni oldini olishga qaratilgan 100 dan ortiq nodavlat, notijorat tashkilotlari faoliyat yuritadi. Hukumat idoralari ularning xulosalari, faoliyatining natijalarini o'rganib tahlil qilib, milliy va etnik yo'nalishdagi siyosatni belgilashda foydalanishga harakat qiladi. Hukumatning Prezident grantlari Fondi tomonidan moliyalashtiriladigan ko'plab nodavlat, notijorat tashkilotlar milliy ozchilikni huquqlarini himoya qilish, ularga nisbatan diskriminatsiyaga yo'l qo'ymaslik, konfliktogen zonlarda jamoatchilik diplomatiyasini yo'lga qo'yishga harakat qilishadi. "Jamoatchilik diplomatiyasi va vatandoshlarni qo'llab-quvvatlash" fondi millatlararo va konfessiyalararo munosabatlarni barqarorlashtirish bo'yicha turli loyihaviy konkurslar tashkil etib g'olib tashkilot va loyihalarga moliyaviy grantlar taqsimlab berishadi. Eng muhimi bunday loyihalarni ishlab chiqishda yoshlar qatlami faol ishtirok etadi.

O'rta Osiyo respublikalarining milliy-etnik muhitini izdan chiqarish sovet davri siyosatining oqibatida yuz bergan. Sun'iy ravishda milliy birliklarning muayyan davlatlar doirasida birlashtirilishi shunday kechdiki, bu mintaqa sovet davlati parchalangach etno-milliy konfliktogen zonaga aylandi. O'zbekiston Respublikasi ham XX asr 90-yillarida bunday ziddiyatlarni boshdan kechirdi. Yaqin qo'shnilarimizdan Afg'oniston, Qirg'iziston, Tojikiston, Qozog'istonda ham konfliktogen o'choqlar mavjud. Qozog'iston bu masalada oxirgi yillarda muayyan qiyinchiliklarni boshdan kechirmoqda. Hukumat etno-milliy konfliktogen muhitni sog'olmashtirish maqsadida 1995 yil 1-martda Qozog'iston Respublikasi birinchi prezidenti Nursulton Abishevich Nazaboyev tashabbusi bilan Qozog'iston xalqi Assambleyasi tashkil etildi. Fuqarolik jamiyatining bu instituti Qozog'iston siyosiy tizimining muhim elementi sifatida mamlakatdagi barcha etnoslarning huquq va erkinliklarining so'zsiz ta'minlanishi masalasini hal etishni maqsad qilgan. Mamlakatdagi siyosiy barqarorlikni ta'minlash, davlat va fuqarolik institutlarining millatlararo munosabatlarni sog'lomlashtirish, ularni samarali harakatini ta'minlashda Assambleyaning roli nihoyatda baland.



Assambleya konstitutsiyaviy organ bo'lib, maxsus qonun bilan faoliyati huquqiy himoyaga olingan. Mamlakat qonun chiqaruvchi organida 9 ta deputatlik o'rnini aynan Assambleyaga ajratilishi ham uning ta'sir darajasi balandligidan darak beradi. Assambleyaning Jamoat fondi mavjud bo'lib, uning moliyaviy qo'llab quvvatlashi natijasida Etnomadaniy birlashma, Yoshlar tashkiloti, Mediatsiya markazi, Jamoat kelishuvi bo'yicha Kengash kabi ko'plab tashkilotlar faoliyat olib bormoqda. 2018 yil Assambleya to'g'risidagi qonunga o'zgartirish kiritilib mamlakatda umummilliy birlik muhitini rivojlantirish Assambleyaning asosiy vazifasi qilib belgilandi.

Qirg'iziston Respublikasi ham postsovet mintaqadagi etno-milliy ziddiyat ba'zan faol, ba'zan pasayib ro'y berib turadigan hudud hisoblanadi. Mamlakatning tabiiy resurslar masalasida qo'shnilari bilan muammolari milliy-etnik ziddiyatlarga aylanib ketish xavfi nihoyatda baland. Aynan Qirg'izistonda ham nodavlat sektordagi tashkilotlar oxirgi yillarda mamlakatdagi etno-milliy vaziyatni barqarorlashtirishga yetarli darajada o'z hissasini qo'shib kelayotganligi diqqatga sazovor. Masalan, Xalqaro tolerantlik jamoatchilik fondi Qirg'izistonning turli mintaqalarida konfliktogen muhitni yumshatishni infratuzilma obyektlarini yaxshilash orqali amalga oshirib kelmoqda. Baotkent viloyatida Fond tomonidan mahalliy aholi ishtirokida suv inshootlarini ta'mirlash orqali to'xtovsiz suv ta'minotini ta'minlashga erishildi. Chunki bu mintaqada suv zaxiralarini yetishmovchiligi ziddiyatlar kelib chiqishining asosiy sababi edi. Fondning say'-harakatlari natijasida mahalliy hokimiyat organlari ham milliy-etnik ziddiyatlarni oldini olish va yumshatish bo'yicha muayyan tajribalarni ham orttirishdi.

Ko'pmillatli O'zbekistonda ham fuqarolik jamiyati institutlarining milliy va etnik barqarorlikni mustahkamlashga qaratilgan tajribasi mustaqillik yillarida o'zining samarali natijalarini berdi. Vazirlar Mahkamasi huzurida Millatlararo munosabatlar va xorijiy mamlakatlar bilan do'stlik aloqalari qo'mitasi faoliyat olib bormoqda. Bugungi kunda Qo'mita mamlakatimizda faoliyat yuritayotgan 147 ta milliy madaniy markaz va 38 ta do'stlik jamiyati hamda xorijdagi vatandoshlarning 38 ta jamiyati bilan hamkorlik qilmoqda. Milliy madaniy markazlar O'zbekistonda yashovchi muayyan bir millat vakillarining milliy madaniy ehtiyojlarini qondirishga xizmat qiluvchi jamoat tashkilotlari sanaladi. Bu jamoat tashkilotlari O'zbekiston Respublikasi Konstitutsiyasi va O'zbekiston



Respublikasining jamoat tashkilotlari to'g'risidagi amaldagi qonunlarga hamda o'z nizomiga asoslangan holda faoliyat ko'rsatadi.

O'zbekistonda yaratilgan qulay millatlararo muhit tufayli tojik, turk va qozoq millatiga mansub aholi vakillari tomonidan 2020 yilda 7 ta yangi milliy madaniy markaz va 2 ta do'stlik jamiyati tashkil etildi. Qo'mitaning davlat ijtimoiy buyurtmasiga asosan 2020 yilda Oliy Majlis huzuridagi Jamoat fondi tomonidan milliy madaniy markazlar va do'stlik jamiyatlarini qo'llab-quvvatlash uchun 600 mln so'm mablag', shuningdek 1,45 mlrd so'mlik grant ajratilgan. Mamlakatimizning oliy mukofoti O'zbekiston Qahramoni unvoni bilan yurtimizda istiqomat qilayotgan 14 nafar boshqa millat vakillarining mukofotlanishi ham millatlararo munosabatlarni mustahkamlash hamisha davlat siyosatining diqqat-e'tiborida bo'lishini bildiradi. Mamlakatimiz milliy siyosati O'zbekistonning ko'pmillatlilikini uning boyligi sifatida qarab, shu yurtni o'z Vatani deb biladigan, uning taqdiriga befarq bo'lmagan, milliy va etnik mansubligidan qat'iy nazar har bir fuqaroni insoniy haq-huquqlari, erkinliklarini munosib himoya qilishga qaratilgan.

## XULOSA

Xulosa o'rnida shuni aytish mumkinki, fuqarolik jamiyati institutlari ham milliy va etnik xarakterdagi ziddiyatlarni oldini olish, ularning keskinligini pasaytirish, qarama qarshi tomonlarning o'rtasida muzokaralar olib borishga yetarli ta'sir o'tkaza oladilar. Shuning uchun polietnik mamlakatlarda siyosiy kommunikatsiya yaxshi yo'lga qo'yilgan bo'lsa fuqarolik jamiyatining institutlari etnik va millatlararo ziddiyatlar profilaktikasi, ularni konfliktogen darajasini pasaytirishga munosib hissa qo'sha oladilar. Chunki nodavlat notijorat tashkilotlari qarama-qarshi tomonlarning nuqtai nazarini, ma'lumotlar almashinuvini yo'lga qo'yuvchi kommunikativ kanalga aylanadilar. Tomonlarga bir-birini manfaat va qiziqishlarini tushunishda hamkor bo'ladilar. Ular axborotni buzib ko'rsatilishiga yo'l qo'ymaydilar. Ularning faoliyati qaysidir davlat organini pozitsiyasini himoya qilishga qaratilmagan, shuning uchun nodavlat notijorat tashkilotlarining milliy va etnik ziddiyatlarga samarali ta'sir o'tkaza oladigan vositalarini munosib baholash kerak va faoliyat ko'rsatishi uchun shart-sharoitlar yaratib berish lozim.

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## ВОЗРАСТНЫЕ АСПЕКТЫ КЛИНИЧЕСКИХ ПРОЯВЛЕНИЙ МНОЖЕСТВЕННОЙ МИЕЛОМЫ

Н. М. Асрарова, А. А. Каюмов, С. Б. Азимова

Республиканский специализированный гематологический научно-практический  
медицинский центр, Ташкентская медицинская академия

### АННОТАЦИЯ

Жизнь пациента с множественной миеломой (ММ) может быть сложной, поскольку болезнь проявляется различными симптомами, которые могут различаться у мужчин и женщин. Недавнее исследование показало, что жалобы на повышенную температуру тела были схожи среди пациентов мужского и женского пола: 45,1% мужчин и 45,9% женщин испытывали этот симптом. В этой статье будут обсуждаться различные симптомы, испытываемые мужчинами и женщинами с множественной миеломой, проливая свет на уникальные проблемы, с которыми сталкивается каждый пол.

**Ключевые слова:** возрастные аспекты, негативное проявление, множественная миелома, возраст, заболевание, пожилой возраст, опухоль костного мозга, онкология, диагностика, лечение.

### ВВЕДЕНИЕ

Множественная миелома (ММ) характеризуется опухолью с неконтролируемой пролиферацией плазматических клеток, продуцирующих патологический иммуноглобулин. ММ остается неизлечимым заболеванием с рецидивами и иногда неконтролируемым прогрессированием, приводящим к смерти независимо от возраста [1]. ММ считается болезнью пожилых людей, средний возраст пациентов на момент постановки диагноза составляет 70 лет. Примерно две трети пациентов на момент постановки диагноза старше 65 лет, а одна треть — старше 75 лет. Заболеваемость ММ увеличивается с возрастом, и в связи с увеличением доли пожилого населения во всем мире ожидается, что к 2030 году число случаев ММ увеличится на 77% [2].

За последние два десятилетия результаты лечения молодых пациентов с множественной миеломой значительно улучшились благодаря внедрению новых стратегий лечения, включая аутологичную трансплантацию гемопоэтических стволовых клеток, долгосрочную поддерживающую терапию и таргетную терапию [3]. Однако исследования показывают, что улучшение результатов не столь существенно для пожилых пациентов (в возрасте 75 лет и старше). Это





объясняется наличием множественных сопутствующих заболеваний в пожилом возрасте, дисфункцией органов, связанной со старением, и индивидуальными особенностями пациента (такими как общее состояние здоровья и сопутствующие заболевания) [4]. Процесс старения происходит постепенно, что приводит к снижению физических и физиологических функций отдельных органов и организма в целом. Назначение химиотерапии пожилым пациентам представляет высокий риск для пациента [5]. Лица в возрасте 65 лет и старше редко рассматриваются в качестве кандидатов на трансплантацию. Терапевтические цели для этой возрастной группы часто отличаются от терапевтических целей для более молодых пациентов [4]. В большинстве случаев основной целью терапии пожилых людей является улучшение качества их жизни, чего можно достичь путем увеличения интервалов между курсами лечения. Однако потенциальное использование новых схем лечения на основе бортезомиба и леналидомида у лиц старше 65 лет не только улучшило качество жизни, но и увеличило показатели выживаемости в этой группе.

Несмотря на наличие абсолютных диагностических критериев симптоматической ММ (гиперкальциемия, анемия, поражение почек, наличие остеолитических поражений), заболевание может проявляться по-разному в зависимости от возраста [6]. У молодых людей ММ может прогрессировать более агрессивно у пациентов с высоким уровнем секреции парапротеина и легких цепей. У пожилых пациентов на момент первичной диагностики могут быть множественные сопутствующие заболевания, приводящие к различной степени изменений органов и тканей. К таким сопутствующим заболеваниям относятся артериальная гипертензия, сердечно-сосудистые заболевания, хроническая болезнь почек, диабет, инфекции и др. Эти заболевания часто способствуют развитию не связанной с ММ почечной недостаточности. Поэтому выявление этих изменений у пожилых первичных пациентов требует дальнейшего исследования и подтверждения поражения опухоли. Например, в 75% случаев анемический синдром при ММ связан с уменьшением продукции эритропоэтина и влиянием избытка цитокинов на эритропоэз. Примерно 25% случаев анемического синдрома могут быть связаны с хроническими заболеваниями, дефицитом железа, дефицитом фолиевой кислоты, дефицитом витамина B12, хронической болезнью почек и другими патологиями, которые чаще встречаются у пожилых пациентов [7].

Возникновение гиперкальциемии часто связано с повышенной резорбцией костной ткани остеокластами или реабсорбцией кальция в почечных канальцах, что приводит к развитию очагового остеолита. Однако в старших возрастных группах



появление симптомов гиперкальциемии может быть связано с эндокринными нарушениями, метастазами в скелете и другими причинами, что затрудняет диагностику на начальном этапе. Ответ на терапию во многом будет зависеть не только от стадии заболевания, но и от соматического или коморбидного состояния пациента на момент постановки диагноза. Анализ результатов лечения пациентов с ММ в различных возрастных группах актуален, поскольку процент пожилых пациентов с ММ увеличивается.

**Целью** работы является выявление клинических особенностей течения заболевания у пациентов разных возрастных групп с диагностированной множественной миеломой.

**Материалы и методы.** В исследование было включено 208 больных ММ, обратившихся за обследованием и лечением в Республиканский специализированный научно-практический медицинский центр гематологии Министерства здравоохранения Республики Узбекистан (РСНПМЦ ГМ МЗ РУз).

Диагноз и стадия множественной миеломы определялись на основании диагностических критериев Международной рабочей группы по миеломе (IMWG 2014) [8].

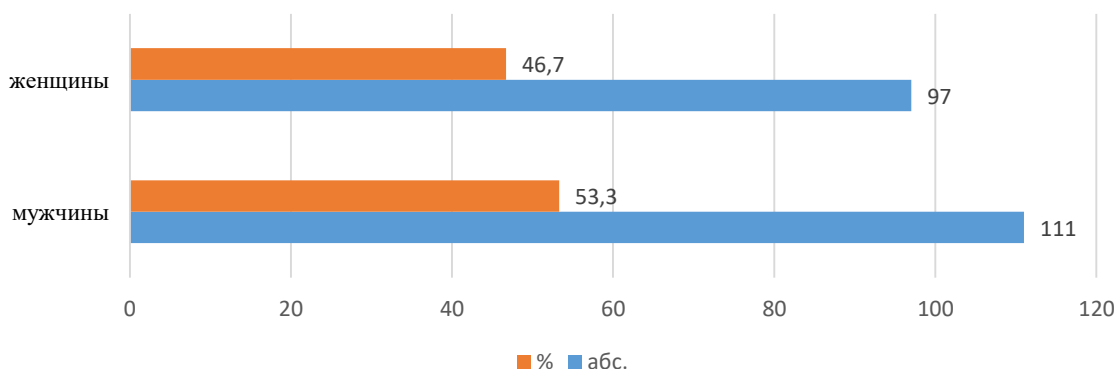
В исследовании использованы клиничко-анамнестические данные, результаты лабораторных исследований крови. Всем пациентам проводилась компьютерная томография и диффузно-взвешенная магнитно-резонансная томография всего тела.

Результаты статистически обработаны с использованием пакета прикладных программ Statistica 6.1.

## РЕЗУЛЬТАТЫ И ОБСУЖДЕНИЯ

Понимание распределения пациентов по полу необходимо в медицинских исследованиях. Это позволяет исследователям выявлять любые потенциальные гендерно-специфические закономерности или различия в проявлении заболевания, реакции на лечение и общем прогнозе.

В нашем исследовании распределение пациентов по полу в исследовании ММ выявило интересные результаты. Из 208 пациентов было 111 мужчин, что составило 53,3% от общего числа, и 97 женщин, что составило оставшиеся 46,7%. Это демонстрирует почти равное представительство обоих полов (см. рисунок 1).



**Рисунок 1. Распределение пациентов основной группы исследования по полу**

Когда речь идет о распределении пациентов с ММ по возрасту, одна конкретная возрастная группа выделяется как наиболее пострадавшая. Понимание демографических данных и статистики может дать ценную информацию об этом состоянии.

В ходе анализа возрастного распределения больных ММ было выявлено, что возрастная группа, наиболее пораженная этим заболеванием, находится в диапазоне 50-70 лет. Эта конкретная группа составила значительную часть, представляя 46-47% всех пациентов. При более внимательном рассмотрении в пределах этого возрастного диапазона большинство пациентов были в возрасте 50-60 лет, составляя 47%, за ними следовали лица в возрасте 60-70 лет, составляющие 46% от общей популяции пациентов. Интересно, что самая низкая заболеваемость множественной миеломой наблюдалась в возрастной группе 20-30 лет, составляя всего 4% случаев.

При анализе распределения пациентов мужского пола по возрастным группам, заметное гендерное неравенство наблюдалось в возрастной группе 60-74 лет по сравнению с женщинами. Среди пожилого населения мужчины преобладали - 22,5%, тогда как женщины составляли только 13,5% случаев. Распределение среди пациентов среднего возраста было более сбалансированным - 28,2% пациентов мужского пола и 25,7% пациентов женского пола. Важно отметить, что в возрастной группе 75-90 лет острый миелоидный лейкоз встречался исключительно у пациентов мужского пола, среди лиц женского пола случаев заболевания не было зарегистрировано.

При изучении клинических проявлений у больных ММ установлено, что анемический синдром выявлен у 154 из 208 пациентов, что составляет 74,5% случаев, что делает его более распространенным по сравнению с другими симптомами. Анемический синдром

проявляется головокружением (69,0%), слабостью (93,1%), одышкой (37,2%).

Кроме того, пациенты жаловались на боли в костях (62,1%), лимфаденопатию (11%), гепатоспленомегалию (3,0%), тошноту и рвоту (42,1%), снижение аппетита (47,6%) и стоматит (2,8%). Повышенная температура тела наблюдалась у 66 из 208 пациентов, что составляет 31,7% от общего числа больных ММ.

Температура тела не превышала нормальных значений в 54,5% случаев. Опухолевая интоксикация наблюдалась у 6,2% больных ММ. Анемический синдром, частое проявление ММ, может проявляться различными симптомами, которые существенно влияют на качество жизни пациентов. Помимо анемического синдрома, у обследованных нами пациентов с множественной миеломой наблюдалось несколько других симптомов, которые еще больше осложняли их состояние. Среди наиболее примечательных проявлений можно выделить:

- более половины пациентов (62,1%) жаловались на боли в костях, которые могли быть сильными и влиять на их подвижность и общий комфорт.

- у 11% обследованных лиц были обнаружены увеличенные лимфатические узлы, болезненные на ощупь.

- у меньшего процента (3,0%) наблюдалось увеличение печени и селезенки, что приводило к дискомфорту и вздутию живота.

- 42,1% пациентов страдали от приступов тошноты и рвоты, вызывающих дискомфорт и влияющих на потребление питательных веществ.

- почти у половины участников (47,6%) с множественной миеломой наблюдалась потеря аппетита, что приводило к потере веса и неполноценному питанию.

- у небольшого процента (2,8%) пациентов развилось воспаление в полости рта, вызывающее боль и затруднение при приеме пищи.

Одним из важных результатов исследования больных ММ стало наличие повышенной температуры тела у подгруппы лиц. Среди 208 пациентов с анемическим синдромом признаки лихорадки наблюдались у 31,7% случаев, тогда как температура оставалась в пределах нормы у 54,5% пациентов. Кроме того, у 6,2% пациентов наблюдалась опухолевая интоксикация, что свидетельствует о более запущенной стадии заболевания с системным воздействием на организм.

При рассмотрении возрастных клинических проявлений ММ следует отметить менее частые симптомы, присутствующие в обеих возрастных группах. Гепатоспленомегалия и опухолевая

интоксикация были выявлены у пациентов старше 60 лет в 3,0% и 6,2% случаев соответственно.

У пожилых людей некоторые симптомы ММ встречаются чаще, чем у молодых пациентов. В то время как у 53,6% пожилых пациентов наблюдалась повышенная температура тела, только у 43,6% молодых пациентов наблюдался этот симптом. Это несоответствие подчеркивает важность возраста как фактора проявления симптомов.

Среди пожилых людей 89,3% показали признаки анемии, тогда как только 70,9% молодых пациентов показали подобные симптомы. Анемия является распространенным осложнением ММ, но ее распространенность варьируется в зависимости от возрастных групп.

Интоксикация опухолью была зарегистрирована у 10,7% пожилых пациентов по сравнению с 5,1% молодых лиц. Это подчеркивает влияние возраста на общую клиническую картину ММ.

Сообщения о болях в костях были более распространены среди пожилых пациентов, причем 64,3% испытывали дискомфорт по сравнению с 61,5% молодых людей. Вовлечение костей является отличительной чертой ММ и может проявляться по-разному в зависимости от возраста. Пожилые пациенты чаще сообщали об одышке, причем 53,6% испытывали этот симптом по сравнению с 33,3% молодых пациентов. Респираторные симптомы могут различаться по тяжести и частоте в разных возрастных группах. У пожилых пациентов также были более частые эпизоды тошноты и рвоты, причем 50,0% сообщили об этих симптомах по сравнению с 40,2% молодых людей. Желудочно-кишечные проявления могут играть значительную роль в общей картине ММ. Снижение аппетита наблюдалось у 56,1% пожилых пациентов, в то время, как только 45,3% молодых людей сообщили о подобной проблеме. Проблемы с питанием могут влиять на лечение и прогноз ММ в разных возрастных группах.

В ходе нашего исследования анемический синдром был выявлен у 90,1% пациентов мужского пола, что проливает свет на распространенность анемии в этой демографической группе. Интересно, что анемический синдром не был выявлен в 9,9% случаев, что ставит под вопрос факторы, способствующие отсутствию анемии у меньшинства пациентов мужского пола. Среди пациентов женского пола клинические проявления анемического синдрома наблюдались в 59,5% случаев. Это различие между пациентами мужского и женского пола побуждает к дальнейшему изучению ключевых факторов, способствующих развитию анемии. Разнообразие проявлений анемического синдрома у пациентов разного пола





подчеркивает необходимость индивидуализированных подходов к лечению, основанных на индивидуальных характеристиках.

Основные симптомы анемического синдрома были одинаковыми как у мужчин, так и у женщин. Распространенными жалобами были головокружение, слабость и одышка. Эти симптомы преобладали в большинстве случаев, подчеркивая влияние анемии на общее состояние здоровья и благополучие. Своевременное облегчение этих симптомов имеет решающее значение для эффективного лечения анемического синдрома.

В нашем исследовании было обнаружено, что увеличение лимфатических узлов и гепатоспленомегалия чаще наблюдались у женщин, при этом 47,3% имели увеличенные лимфатические узлы и 14,9% испытывали увеличение печени и селезенки. Кроме того, у 9,5% пациентов женского пола была отмечена опухолевая интоксикация, а у 1,4% - стоматит. Эти результаты свидетельствуют о том, что у женщин с анемическим синдромом может наблюдаться другой набор симптомов по сравнению с мужчинами.

С другой стороны, мужчины чаще испытывали опухолевую интоксикацию, 2,8% мужчин сообщили об этом симптоме. Стоматит был более распространен среди мужчин, поражая 4,2% пациентов мужского пола. Интересно, что оссеалгия, характеризующаяся болью в костях, была выраженным симптомом у более чем 70% пациентов мужского пола в начале заболевания. Эти результаты показывают, что проявление симптомов множественной миеломы может различаться у мужчин и женщин (см. рисунок 2).



Рисунок 2. Анализ частоты клинических симптомов ОМЛ в зависимости от пола пациентов.

Исследование также выявило влияние множественной миеломы (ММ) на здоровье костей, при этом поражения костей были обнаружены у 80% пациентов на рентгеновских снимках. Деструктивные изменения чаще всего наблюдались в черепе, костях таза, поясничном отделе позвоночника и крестце. Исследования МРТ выявили остеодеструктивные изменения в позвонках и метастатические поражения в костной ткани у 76% пациентов. Это подчеркивает важность мониторинга здоровья костей у лиц с ММ.

## ВЫВОД

В области медицинских исследований понимание того, как конкретные демографические переменные, такие как пол и возраст, влияют на прогрессирование и исходы различных заболеваний, имеет решающее значение. Множественная миелома (ММ), рак, поражающий плазматические клетки в костном мозге, не является исключением. Исследования показали, что пол может играть значительную роль в развитии осложнений или реакции на лечение у пациентов с ММ.

Исследования показали, что у пациентов мужского пола с ММ может наблюдаться более высокая частота определенных осложнений или сопутствующих заболеваний, связанных с заболеванием. Напротив, пациенты женского пола могут демонстрировать иную реакцию на лечение или профили побочных эффектов. Эти гендерные различия подчеркивают необходимость адаптации медицинских вмешательств для удовлетворения уникальных потребностей каждой гендерной группы.

Изучение распределения пациентов с ММ по возрасту проливает свет на наиболее уязвимую возрастную группу, подчеркивая важность возраста как фактора риска для этого состояния. Понимая демографические данные и различия в разных возрастных диапазонах, специалисты в области здравоохранения могут адаптировать подходы к лечению для удовлетворения индивидуальных потребностей пациентов в каждой возрастной группе.

Продолжение исследований и анализ возрастных тенденций в ММ помогают в разработке более целенаправленных и эффективных стратегий лечения этого заболевания. Клинические проявления ММ, такие как синдром анемии и другие симптомы, подчеркивают сложную природу этого состояния и проблемы, с которыми сталкиваются пациенты.

Распознавание уникальных симптомов, испытываемых мужчинами и женщинами с ММ, имеет решающее значение для эффективного лечения заболевания. Признавая эти гендерно-специфические проявления, поставщики медицинских услуг



могут адаптировать вмешательства для удовлетворения разнообразных потребностей всех пациентов.

Более того, изучение гендерных и возрастных демографических показателей при ММ имеет важное значение для улучшения результатов лечения и совершенствования подходов к лечению. Более глубокое понимание влияния пола и возраста на прогрессирование заболевания и лечение может привести к более персонализированному и эффективному уходу. Продолжение исследований и рассмотрение нюансов потребностей пациентов с ММ являются ключевыми шагами в продвижении стратегий лечения этого сложного состояния.

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## BASED ON THE DEVELOPMENT OF THE PRINCIPAL SCHEME OF THE HYDRAULIC OPERATION OF VOLUME PUMP DEVICES

**Oybek Mustafaev**

Ph.D., Associate Professor of the "Mining Electrical Mechanics" department, Navoi State University of Mining and Technologies

**Lazizbek Murodullo ugli Husanov**

4th year student of Navoi State and Mining Technology University

### ABSTRACT

Nowadays, a number of machines and equipment with a hydraulic system are widely used in mining, construction and agriculture. In order to increase the stable and reliable operation of the hydraulic systems of these machines, it is important to develop their correct principle schemes, and this article presents analyzes on the justification of the development of the principle scheme of the hydraulic operation of volume pumping devices.

**Keywords:** pump, handling, principle scheme, hydraulics, machine, equipment, control devices, hydraulic motor, and hydraulic cylinder.

### INTRODUCTION

Hydraulic drive is a set of hydraulic machines, hydraulic equipment, hydraulic lines (pipes) and auxiliary devices, and it is called a hydraulic system designed to transfer energy and convert motion through a fluid. At the same time, it is possible to regulate and reverse the speed of the output device, as well as transfer one type of movement to another at the same time [1,2].

The hydraulic machines that are part of the hydraulic system are pumps and hydraulic motors, and there can be several of them.

Hydraulic devices are devices for controlling hydraulic operation, with the help of which it is regulated, as well as means of protecting it from high and low pressures of the liquid. Hydraulic equipment includes throttles, valves for various purposes, and distribution devices for changing the direction of hydraulic fluid flow [3].

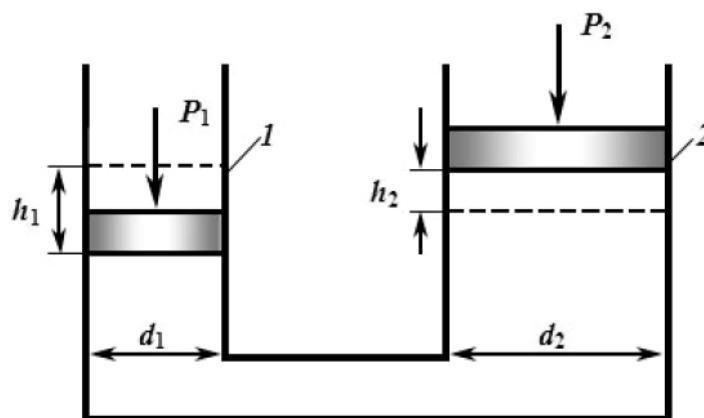
Auxiliary devices are called conditioners of the working fluid, which serve to ensure its quality and condition. These are various particle separators (filters), heat exchangers (heaters and coolers), hydraulic tanks and accumulators [4].

The hydraulic control elements are interconnected by hose hydraulic lines through which the working fluid moves.



## LITERATURE REVIEW AND METHODOLOGY

Let's look at the structural scheme of the simplest piston hydraulic system in Fig. 1.



**Figure-1. Structural scheme of the simplest piston hydraulic drive**

Two cylinders (1 and 2) are filled with liquid and connected to each other through a straight pipe. The piston of the 1st cylinder moves down a distance  $h_1$  with the force  $P_1$  supplied from above and discharges the liquid into the 2nd cylinder. In this case, cylinder 2 moves the piston up a distance  $h_2$  and carries the load  $P_2$  up[5,6].

If we ignore pressure losses (hydraulic losses and friction losses), according to Pascal's law, the pressure created by the force  $P_1$  in cylinder 1 is equal to the entire volume of the liquid:

$$p_1 = \frac{P_1}{F_1} = \frac{P_2}{F_2} = p_2.$$

where  $F_1$  and  $F_2$  are the surfaces of pistons of cylinders 1 and 2.

Then the relationship between the pressure forces acting on the pistons is as follows [7]:

$$P_2 = P_1 \left( \frac{d_2}{d_1} \right)^2.$$

The liquid can be considered almost incompressible and the cylinders completely sealed.

$$h_1 F_1 = h_2 F_2$$

The dependence of the power spent on the movement of the piston in the 1st cylinder is determined by the following expression[8]:

$$N = P_1 v_1 = p_1 F_1 v_1.$$





In the formula given above, the multiplication of speed and consumption gives the consumption

$$v_1 F_1 = Q.$$

Then the law of conservation and transfer of energy (in the absence of hydraulic losses and frictional forces) takes the following form[9]:

$$P_1 v_1 = p Q = P_2 v_2. \quad (1)$$

here,  $P_2 v_2$  – 2 is the power developed by the piston, that is, the indicator representing the dependence of the system on the output device given per unit of time.

From the formula (1) above, it follows that increasing the power of the hydraulic drive is more beneficial not by increasing the area of the pistons (which leads to an increase in dimensions), but by increasing the pressure, since in this case a small increase in the volume and weight of the hydraulic drive "growth occurs due to the need to increase its strength [10,11].

## RESULTS

Depending on the purpose of the hydraulic system and in accordance with the selected option of the initial data, it is necessary to make a sketch of the principle scheme of the hydraulic system, which is then tested and determined by calculations. The scheme uses all the elements of equipment necessary for its operation. Symbols of elements are adopted in accordance with normative documents [12,13,14].

Next, you need to choose the method of regulating the speed of the hydraulic drive at the output link: throttle (picture 1) or volumetric (picture 2) [15].

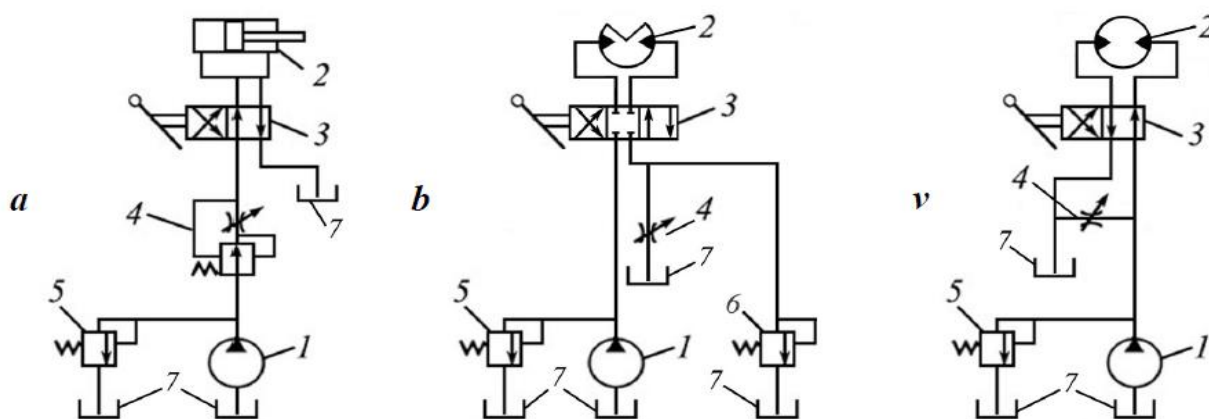


Figure 2. Throttle regulation hydraulic system:

1 – pump; 2 - hydraulic motor (a - power hydraulic cylinder; b - moment hydraulic cylinder);

v - hydromotor); 3 – distribution device (a – two-stage; b – three-stage);

4 – throttle regulator; 5 – overflow valve; 6 – safety valve;

7 – pouring tube.

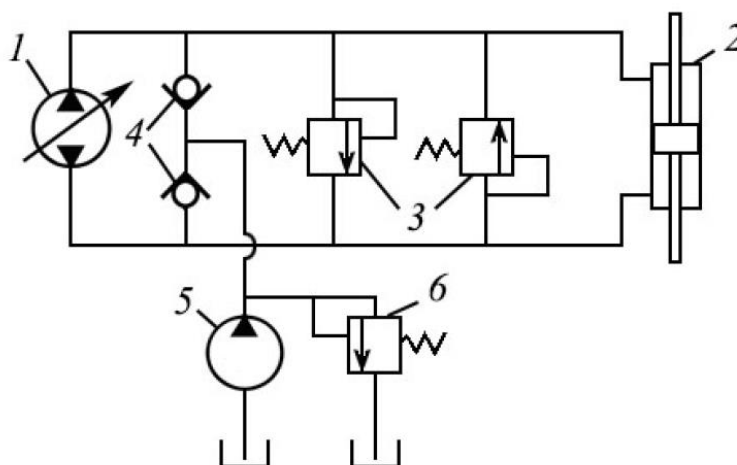
A In this case, it is necessary to analyze the aspect of technical and economic efficiency. Throttle controlled hydraulic systems are relatively easy and inexpensive to operate. However, due to large energy losses, the throttle regulation method is currently used in low-power hydraulic systems ( $N < 15$  kW) in production conditions [16,17].

By installing a throttle in the main pressure pipeline, a series throttle regulation is implemented (Fig. 1,a) and is used in cases where there is a load of one sign at the output link.

When there is a variable load or large accelerations of the output link, a regulating throttle should be installed in the main pipeline (Fig. 1, b).

The parallel throttling regulation method (Fig. 1.v) has a higher efficiency than the series throttling method, so it can be used with relatively high power requirements (from 10 to 15 kW). However, the disadvantages of such a hydraulic system are a decrease in external network characteristics, regulation accuracy and stability.

Regulation with a hydraulic driving power of more than 15 kW, despite the relatively high price of the hydraulic machine, it is necessary to adopt the volumetric regulation method (Fig. 2).



**Figure 3. Volume regulation hydraulic system:**

1 – regulating pump; 2 – power hydraulic cylinder; 3 – safety valve;

4 – reverse valve; 5 – auxiliary pump device for supplying the system;

6 - overflow valve.

## DISCUSSION

- The choice of the regulation method can be made by the output power of the hydraulic system in the following cases:
- in hydraulic motors and torque hydraulic cylinders:

$$N = M_{st} w$$

- in power hydraulic cylinders:

$$N = R_{st} v$$

The value of the magnitude of the angular velocity:

- for the hydraulic motor shaft:

$$w = \frac{2\pi n}{60} \text{ (1/sek)}$$

- for hydraulic cylinder torque

$$w = \frac{\varphi}{t} \frac{2\pi}{60} \text{ (1/sek)}$$

Movement speed of the hydraulic cylinder shaft:

$$v = \frac{s}{t}$$

## CONCLUSION

Based on the above analysis and results, the general load applied to the hydraulic system during the development of the principle scheme consists of static and inertia and is determined as follows:

- for hydraulic motors and torque hydraulic cylinders:

$$M = M_{st} + M_{in} ;$$

- for power hydraulic cylinders:

$$R = R_{st} + R_{in} .$$

$$M_{in} = J \varepsilon ,$$

where, J is the moment of inertia of the moving parts on the output shaft;  
 $\varepsilon$  is the angular acceleration of the shaft.

The angular acceleration of the shaft is determined as follows:

$$\varepsilon = \frac{\omega}{t}$$

where,  $t'$  is the mode entry time, which is assumed to be equal to one-tenth of the duty cycle (0.1 t), but not exceeding 1 s.

The magnitude of the inertial force is determined by the following formula:

$$R_{in} = m a ,$$

We can see that the volume pumping devices of the hydraulic system depend on a number of indicators, which are necessary to justify the development of the principle scheme of the hydraulic system. On the basis of the above results, the principle scheme of volumetric hydraulic treatment will be built, and through this principle scheme, it will be possible to ensure the operation of hydraulic treatment at optimal efficiency.

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## HARMONIZING RENEWABLE ENERGY WITH CONSERVATION: EXPLORING OPPORTUNITIES THROUGH SOLAR FARM DESIGNS

**Ahad khan Pyawari**

Associated professor, the lecturer of physic department Electro mechanics faculty.

Polytechnic university. Kabul Afghanistan

[apyawari@yahoo.com](mailto:apyawari@yahoo.com)

**Yaqub Ali Mutahhari**

Senior teaching assistant, the lecturer of physic department, Education faculty. Parwan

university. Parwan Afghanistan

[ymutahhari2@gmail.com](mailto:ymutahhari2@gmail.com)

### ABSTRACT

Competition among land uses is making it increasingly difficult to set aside adequate space for wildlife and nature conservation, so it is imperative that opportunities that simultaneously achieve commercial and conservation outcomes be identified and seized. Such opportunities exist in the renewable energy industry. It is widely recognized that renewable energy generation benefits the ecosphere through reduced carbon emissions, but currently, further opportunities for realizing direct and indirect conservation benefits through the design of solar farms are less well known. Among other opportunities, solar farm designs that deliver environmental credits through carbon sequestration and biodiversity improvements can deliver higher financial returns. Other opportunities to improve local hydrology, pollination, and pest control services could be available depending on site-specific characteristics where solar farms are built and the other land use practices that exist or are possible in the immediate vicinity.

**Keywords:** Renewable energy, Solar farms, Conservation, Biodiversity, Urban green spaces, Energy mix, Public and media relations, Sustainable development.

### INTRODUCTION

As countries face the need to reduce exposure to volatile fossil fuel energy prices and greenhouse gas emissions and improve the security of energy supplies, renewable energy sources are becoming increasingly important. The European Renewable Energy Council (2010) has set out a 100% renewable energy vision for The European Union and has analyzed 'the economic, environmental and social benefits likely to accompany such a transition.' Arguably more realistically, if less ambitiously, the U.K. Government is committed to meeting 15% of the nation's energy needs from renewable sources by 2020 as part of its strategy to reduce greenhouse gas emissions and reduce dependency on imported energy supplies. Looking further ahead, the U.K. government has suggested that 'renewables will also have a crucial role to play in the U.K. energy mix in the decades beyond, making the most of the U.K.'s

abundant natural resources' (Gov. UK 2013). One of the core principles within the National Planning Policy Framework (NPPF) is that 'planning should.....support the transition to a low carbon future in a changing climate' by, inter alia, 'the development of renewable energy' (Department for Communities and Local Government 2012). More specifically, the NPPF stresses the need 'to help increase the supply of renewable and low carbon energy, local authorities should recognize the responsibility on all communities to contribute to energy generation from renewable and low carbon sources' The development of energy resources has traditionally had a wide range of contested impacts on the economy, the environment and everyday life, focused for example, on nuclear power and the reprocessing of nuclear fuels, major oil spills in marine environments, the closure of coal mines and the effect on coalfield communities and more recently on the fracking of oil shales. Many of the leading public and media relations firms have been working on fossil fuel energy issues for many years, and this work has often been managed in an atmosphere of intense and occasionally hostile public and media scrutiny. The mix of renewable energy resources currently includes wind, hydro-electric, tidal, biomass, and solar power, but a recent study of communication best practices for renewable energy suggested that 'although numerous examples of good practice in communications for renewables were observed in the process of undertaking this study, rigorous, well planned and adequately evaluated communication strategies were not the norm' (Collings, Cottrell, and Leopold 2013). In a similar vein, research undertaken by the CC Group (2012) concluded that 'investing in communication activity is becoming of increasing importance to the success of renewable energy businesses.' The continuing development of both onshore and offshore wind farms within the U.K., particularly in northern and western regions, has stirred considerable public, political, and media controversy. That said, solar energy is the most abundant of all the sources within this mix, and PricewaterhouseCoopers (2010) has suggested that solar power 'shows increasing potential as an alternative to existing fossil fuel sources.' With this in mind, this paper outlines the characteristics of solar farms, describes their development within the U.K., examines some of the issues raised by these developments, and offers a concluding discussion of the contributions that public and media relations firms can make to the development of solar farms. (Department for Communities and Local Government 2012).

Human population growth continues to exert increasing pressure on the land resources upon which we rely for diverse ecosystem services. Setting aside natural areas for wildlife and nature conservation, land sparing (Box 1; Fischer et al. 2008) has an important role in maintaining natural resources and the services they provide. Given the often large and widely distributed areas required to conserve biodiversity and the necessity of ensuring that such areas are properly managed and protection is enforced (Phalan et al., 2011), resources available for nature conservation are seldom sufficient. Consequently, approaches other than land sparing to conserve biodiversity have gained more attention in recent years, especially in urban landscapes (Ives et al., 2016; Wolch et al., 2014). Urban green spaces, public parks and



gardens, and green roofs and walls support increased biodiversity in patches across anthropogenic landscapes (Goddard et al., 2010). Further, many of these urban green spaces are multi-functional, supporting biodiversity, food production (e.g., public gardens and green roofs), and recreation (e.g., parks and golf courses). Such spaces can also provide additional benefits of improved air quality (Nowak et al., 2006), better physical and mental health (Ward Thompson et al., 2012; Wolch et al., 2014), and reduced heat-island effects (Tsilini et al., 2015). By leveraging these effects, urban designs can contribute to the achievement of the United Nations' Sustainability and Development Goals (United Nations, 2015). Beyond urban limits, the emergence of regenerative agriculture is another example of attempts to simultaneously achieve financial and conservation benefits. In such landscapes, the construction of solar farms presents an additional opportunity to codesign facilities that focus on achieving better commercial returns for agriculture and renewable energy businesses while improving conservation outcomes. Here, we examine the influence of spatial pairing of agricultural and solar assets and agrivoltaic systems (Dinesh and Pearce, 2016; Dupraz et al., 2011a) on the achievement of simultaneous benefits across agriculture, industry, and conservation (Fig. 1; Semeraro et al. 2018).

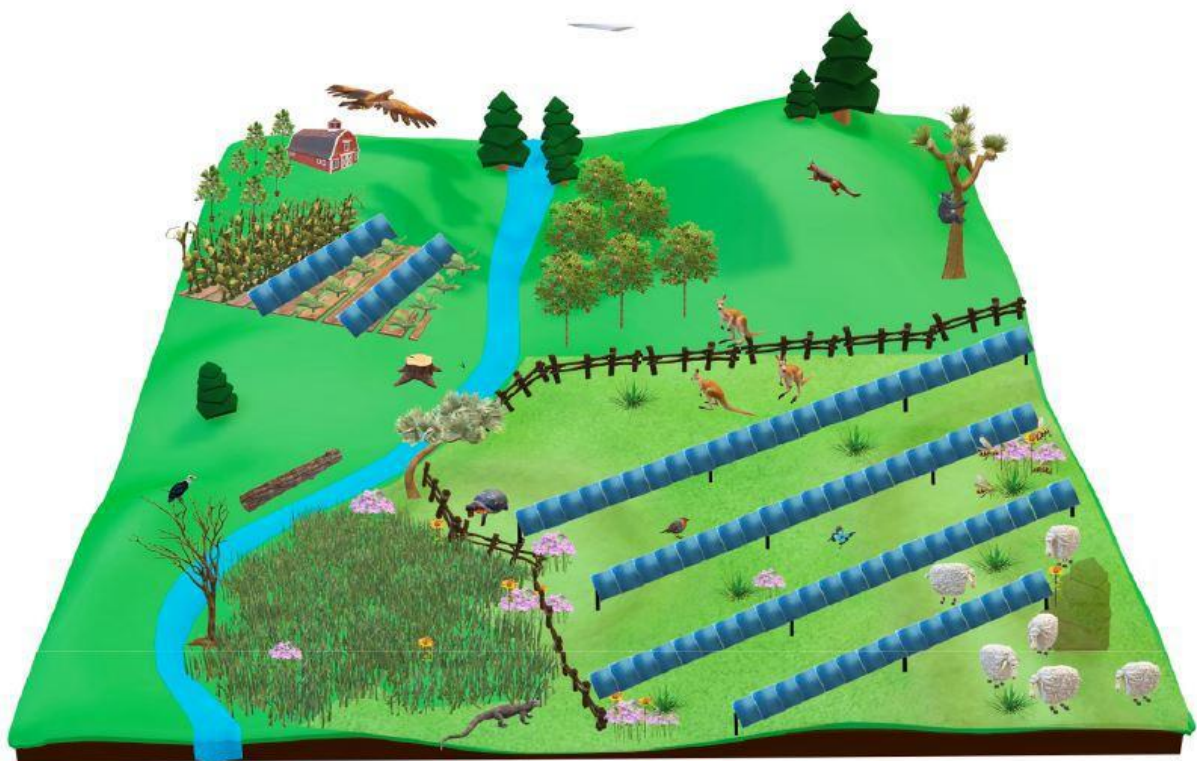


Fig. 1. A hypothetical agrivoltaic system in Australia. Solar panels are co-located within croplands and on existing grazing land. (Semeraro et al. 2018).

### Solar Farms

While there is no official definition of a solar farm, it is essentially an area of land on which a large number of solar panels are deployed to generate electricity, producing very little noise, having no moving parts, and no harmful emissions. More specifically, solar farms are large arrays of

interconnected solar panels that work together to capture sunlight and convert it directly into electricity. The active elements within the solar panels are silicon solar cells, which have at least two layers with positive and negative charges. The electric field across the junction between the two layers causes electricity to flow when the semiconductor absorbs photons of light and releases electrons. The electricity so generated is cabled to one or more (depending on the size of the solar farm) inverters, electrical power converters that change direct current into alternating current electricity. The output can be connected to both local users and the national grid. Solar energy generation is at its strongest during the daytime when the demand for electricity is high, and when the solar farm produces more electricity than is required locally, then the surplus is fed into the national grid, and when there is a shortfall, extra power can be drawn from the grid.

Globally, the geography of solar farms reflects a number of factors, including operational economics, global solar energy potential, and access to the national grid. The operational economics, more particularly consistently advantageous fiscal financial support and grid parity, has been particularly important in influencing the distribution of solar farms. In the future, the geographical pattern of solar farms may change as different regions achieve grid parity. Worldwide solar energy potential is at its lowest in high latitudes and at its highest in desert areas of Africa and Australia. That said, most of the world's densely populated areas, including large areas of Africa, Australia, the Middle East, the Indian subcontinent, the southern United States, and Mexico, large areas in South America, and much of southern and western Europe, offer suitable levels of solar energy potential. Access to national electricity grids, more particularly proximity to electricity substations or power connectors, is important because power losses from cables increase with distance.

### ***The Development of Solar Farms in the U.K.***

While there is no national register, and hence no definitive information on the number of solar farms in the U.K. per se, the use of solar power has increased rapidly, albeit from a low base level, in recent years, and anecdotal and trade evidence clearly suggests that the number of solar farms is rapidly increasing. Solar Voltaic Energy (2013), for example, listed 91 major '*solar energy schemes*' as having been commissioned by April 2013, with a further 56 being classed as approved or under construction and a further 32 proposed or going through the planning process. The global irradiation and solar energy potential within the U.K. varies from 980 kilowatt hours per meter squared in the far north of Scotland to 1240 kilowatt hours per meter squared in the southwest of England, and it is the southwest and southeast of England where the development pressure, as evidenced by the number and the scale of solar farm projects, is greatest. While some solar farms have been developed on brownfield sites, for example, on disused airfields or former landfill sites, many have been proposed and developed on agricultural land. The Wheal Jane solar farm was the first to be commissioned in Cornwall. It is on the site of a disused tin mine, and the farm's 5,700 solar panels yield a generating capacity of 1.5 MW, it can provide electricity for up to 430 homes and saves over 700 tonnes of carbon dioxide emissions per annum. Somerset's first solar farm on a 4-hectare site at





Sandhill Park, near Bishops Lydeard, has been providing electricity to some 600 homes since 2011. The U.K.'s largest solar farm, which had a capacity of 34 M.W., was developed at a cost of £35 million on a former military airfield at Wymeswold near Loughborough in Leicestershire and became operational early in 2013. In April 2013, solar farm developers were paying farmers up to £50,000 per annum for a 20-hectare site in the South East and South West of the U.K. and up to £40,000 in the Midlands and East of England, but precise figures reflect annual sunlight levels and other factors including access and topography.

Solar farm developers typically look for sites offering between 10 and 20 hectares, and they normally take on the planning costs and risks in funding projects through commissioning. More specifically, a number of development criteria can be identified in that potential solar farm sites should:

- offer between 10-20 hectares of land of low-grade agricultural land, though there is no upper limit on size
- Ground that is flat or gently sloping and south-facing
- not be overlooked from public vantage points or neighboring houses
- offer easy access for construction and maintenance work
- be free from surrounding buildings or trees that would cast a shadow
- not prone to flooding
- be free of rights of way
- have no underground pipes crossing the land
- be in proximity to a major overhead power line
- not be in environmentally sensitive areas, areas of archaeological significance, or areas of significant landscape value
- be available to lease for at least 20 years

#### ***Potential commercial and environmental returns from agrivoltaic systems***

The Opportunities Presented By Designing Land Sharing Schemes That Incorporate Renewable Energy Production, Agriculture, And Nature Conservation Are Just Starting To Be Understood And, In A Very Limited Number Of Cases, Realised (Dupraz et al., 2011a; Hernandez Et Al., 2015; Kiesecker Et Al., 2011; Semeraro Et Al., 2018). Such Opportunities Should Be Vast Given The Very Considerable Land Areas Globally Being Committed To Renewable Energy Generation (REN21, 2019; Trainor et al., 2016) And The Extensive Application Of Land To Agriculture (E.G., 48.6 Million Km<sup>2</sup> [37.4% Of Global Land Area]; World Bank Group 2016). Indeed, The Co-Location Of Photovoltaic (P.V.) Solar Facilities Within Agricultural Landscapes Can Increase Productivity Of Crops Under Solar Panels (Dupraz et al., 2011b; Marrou et al., 2013c), Increase Soil Carbon, And Reduce Water Evaporation (Armstrong et al., 2014; Hassanpour Adeh Et Al., 2018; Marrou Et Al., 2013a).

#### **Understanding the potential benefits and limitations of agrivoltaic systems**

##### ***P.V. solar farm performance***

Solar farms require ongoing maintenance. This maintenance can include keeping the solar panels free of debris (e.g., dust, leaves, bird

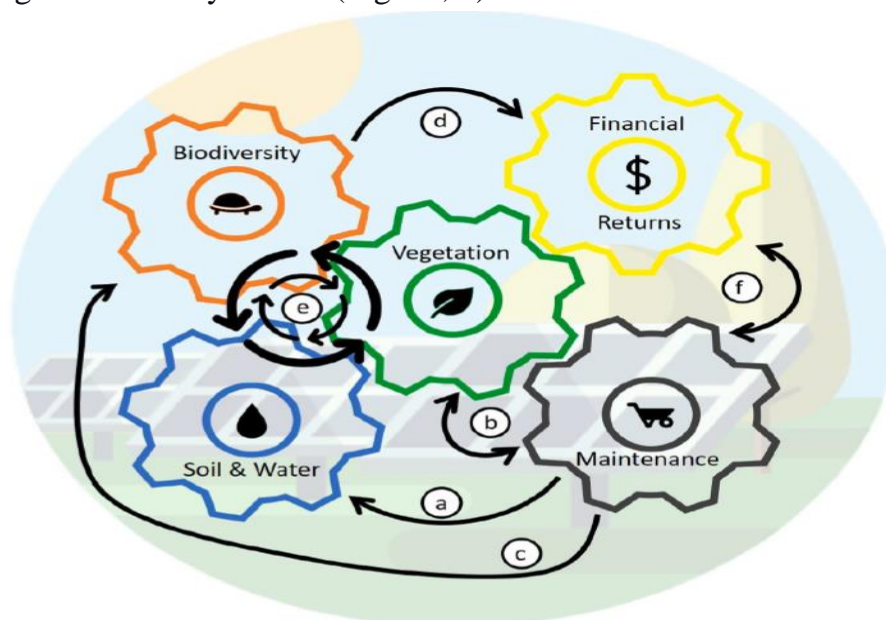


droppings), which can reduce panel efficiency by up to 7% over extended periods without rain or panel cleaning (Goossens and Van Kerschaever, 1999; 8

Jaszczur et al., 2019; Mejia et al., 2014). Therefore, panels need cleaning periodically to maintain high levels of energy production (Fig. 2a; Mani & Pillai, 2010; Lovich & Ennen, 2011).

In addition, large-scale P.V. solar farms increase local ambient temperatures and act as heat islands (Armstrong et al., 2016; Barron-Gafford et al., 2016; Edalat, 2017; Zhang & Xu, 2020) which can reduce the efficiency and performance of solar panels (Fesharaki et al., 2011; Kande et al., 2016; Popovici et al., 2016) and have negative impacts on plants and wildlife (Yow, 2007). Vegetation cover around and under solar panels can reduce this heat-island effect and help maintain solar panel efficiency (Kande et al., 2016; Tsilini et al., 2015). For example, vegetative ground cover can reduce the degradation of solar panel backsheets (the protective layer on the backside of the solar panel). Backsheets protect the internal electrical components from weathering and act as insulation for the solar panel (Gambogi et al., 2013; Oreski & Wallner, 2005; Voronko et al., 2015).

Through such design considerations, solar farms have the potential to increase their financial returns by using grazing livestock for vegetation management to suppress vegetation from over-shading solar panels. Further, in some systems, native herbivores could be encouraged to occupy and forage within solar facilities (e.g., kangaroos or wallabies in Australia, pronghorn antelope in the USA), providing biodiversity benefits, as well as 9 low-cost vegetation management that may also, in some cases, provide additional income through biodiversity offsets (Fig. 2c, d).



**Fig. 2.** Conceptual model of components and interactions that influence land condition in agrivoltaic systems.

Five major components are summarized through their interactions (represented by a – f and described in the text): Biodiversity (wildlife habitat, species diversity, refugia and cover,



pollinator and predators, and ecosystem services); Soil and Water (run-off, erosion, soil moisture, soil compaction, dust accumulation, nutrients, fertilizers); Vegetation (ground cover, vegetation complexity, weeds, food production); Maintenance (clearing, infrastructure, mowing, herbicide use, pesticide use, livestock health, cultivation, and harvest); Financial returns (carbon credits, electricity production, jobs, site maintenance, pest control, profit through livestock/crop yields, supplemental feeding for livestock).

### ***Design and placement of solar farms***

The installation of solar farms can disturb landscapes through large-scale clearing and site preparation. The construction of any solar farm will cause some level of disturbance to natural habitats. The net benefits of building a new farm will depend on at least two factors: the original quality of the land prior to its current use and its current state. For example, high-quality habitats that have been degraded in recent years through intense cropping, overgrazing, or other damaging agricultural or industrial practices have the most to gain from regenerative approaches available to agrivoltaic systems. Regenerative agriculture coupled with P.V. solar capacity can help improve the economic profitability and environmental and ecological values of a site. Degraded landscapes of historically high quality that are selected for regenerative agrivoltaic sites have the potential to experience the lowest relative degradation and benefit most over the long term, given their current poor land condition. Of course, many agricultural properties are well-managed and not degraded. In these cases, landowners may be able to improve low-productivity areas (perhaps with poor soil nutrients, rocky or undulating land, etc.) through land-sparing patches or co-planting alongside solar panels. Generally, the design and potential outcomes from agrivoltaic installations will be site-specific. For example, landscapes that support burrowing species, such as desert tortoises (*Gopherus agassizii*) or burrowing owls (*Athene cunicularia*), may be adversely affected if burrows are collapsed by machinery during solar farm construction (Gibson et al., 2017; Lovich & Ennen, 2011). Ideally, such negative impacts could be minimized by using existing low-quality habitats and or low-productivity agricultural areas or improving solar farm design and construction. Many factors determine the suitability of sites for P.V. solar farms, including the quality of the solar resource (Hernandez et al., 2014; Lovich & Ennen, 2011; Moore-O'Leary et al., 2017)

### **Research priorities and recommendations**

Typically, solar farms are designed and managed only to produce renewable electricity. Therefore, it is reasonable for solar farm developers to target locations with the highest quality solar resources that can easily be connected to electricity grids or local loads. There are, however, greater financial returns possible by coupling solar farm returns with agricultural production and environmental restoration and conservation. Agricultural markets are well developed and understood and can easily be modeled in combination with power production to create agrivoltic designs that generate greater returns. Environmental markets for carbon and biodiversity credits and natural capital are much less well-known and are changing rapidly. Currently, carbon credits, perhaps the best known of these markets, vary by more than an

order of magnitude in price, and it is reasonable to assume the value of these credits will increase substantially as more carbon reduction targets are legislated and the demand from the voluntary market continues to expand. Moreover, the opportunity for landholders to access debt and equity to support their businesses by leveraging their natural capital is only just starting to emerge as a financial instrument. Clearly, much more research will be required to understand and capture these emerging market opportunities. These additional returns can be realized not just by accessing these additional revenue streams but also by realizing available synergies among different land uses in close proximity. For example, appropriate ground cover under and in the vicinity of solar panels could lower running costs for solar facilities while producing carbon and other environmental credits, such as access to run-off mediation funds, while providing pollination and pest control services to adjacent horticultural production (Delaney et al., 2020; Li & Waller, 2015). Consequently, rather than simply focusing only on existing priorities, such as optimizing the design, placement, and maintenance of solar facilities (Peschel, 2010; Sinha et al., 2018), considerable opportunities exist to consider how landscapes can be improved, rehabilitated, or both, through the production of multiple products from a mosaic of land uses in more sustainable ways. These opportunities exist in a variety of combinations that could include energy production, shade-tolerant crops, feed for livestock, and wildlife refuges, among others. While the potential to apply such design principles for simultaneous and improved conservation, sustainability, and commercial returns clearly exists, understanding how to design for such synergistic outcomes is in its infancy. A better understanding of these opportunities will arise from research directed to address specific questions regarding how to determine the most appropriate mix of scales and patterns of deployment of various land uses. The opportunities for codesign will be complex and location-specific, depending on a combination of ambient environmental conditions, the agricultural land uses possible and practiced at that location, the regulatory frameworks under which such a facility will operate in terms of the environmental costs and credits available, and the types of technology deployed. Decision support tools will also need to be developed to optimize these choices in different circumstances. We suggest that future solar projects should initially explore multiple uses of their sites to achieve better environmental and commercial outcomes. In its simplest form, an agrivoltaic system might support both energy production and under-panel crop production. Such a design would reduce the land required for both uses (i.e., increase the LER) while supporting at least some biodiversity. Alternatively, an agrivoltaic system that uses livestock for vegetation management could reduce labor costs for staff to mow or spray vegetation, support local graziers via leasing solar farmland to feedstock, and incidentally provide habitat for plant and animal diversity. These co-benefits may be further increased by incorporating inter-panel vegetation buffers and tree and shrub buffers around solar facilities, especially in mosaics of other land use systems. As our knowledge of the opportunities in this space increases, agrivoltaic solar facilities have the potential to contribute to the rehabilitation, and possibly improvement, of biodiversity on degraded landscapes of poor ecological and



economic value and increasing the economic returns to solar farms and agriculture while improving land condition and conservation outcomes. Rather than constructing new facilities on undisturbed native vegetation or green-field sites, even areas of low biodiversity value, developers could focus instead on reusing degraded landscapes for solar farm development (Cameron et al., 2012; Milbrandt et al., 2014). Degraded landscapes, overgrazed land, low-productivity croplands, and sites disturbed by anthropogenic practices are plentiful, and many could potentially be repurposed. These degraded landscapes are generally under-used, have poor yield potential, are difficult to cultivate, or have low economic value that makes them comparatively inexpensive to acquire. However, some regions may be constrained by access and proximity to electricity grid connections and access roads for construction. Alternatively, site selection for solar energy projects may raise local real-estate prices with the promise of better access to grid power in the vicinity of solar farm installations, thereby increasing property values or commercial development potential. The reuse of degraded or lower-quality agricultural land, already modified from its original state, provides an opportunity to rehabilitate or improve land in support of better agrivoltaic system revenues and improved biodiversity (Hernandez et al., 2016; Kiesecker et al., 2011). Such modification of existing landscapes into agricultural, environmental, and energy-generating mosaics will undoubtedly produce trade-offs whereby one use of the space is compromised in favor of another. Such trade-offs should be reduced to some extent through careful design and management that minimizes negative effects and enhances the positive ones (Neilly et al., 2018). P.V. solar farm facilities have generally conformed to standard designs, with panels situated in rows, generally mounted 1–3 m off the ground, depending on the racking and mounting system used. Other designs for solar panel deployment could mitigate, to some extent, the ongoing need for vegetation management (Fig. 2b,f) or allow grazing livestock to access vegetation under panels (Guerin, 2017). Rather than solar panels sitting close to the ground, if panels were situated at least 2 m above the ground at their lowest point, many grasses and shrubs would not grow tall enough to block the panels from sunlight. Further, this may allow additional vegetation types to be incorporated into solar facilities (e.g., shrubs and low woody vegetation), which could provide more habitat structural complexity, leading to increased biodiversity (Neilly et al., 2018; Nordberg & Schwarzkopf, 2019). Yet, to our knowledge, no solar facilities have experimented with the structural design of solar panels in this manner. Clearly, the additional costs of materials to place solar panels further above ground on solar farms would need to be offset by savings on vegetation management (mowing, spraying, etc.), dust control, and income from available environmental credits, and other revenue streams from producing food or fiber on the same sites. Conversely, on-ground solar arrays are now available to reduce the costs of deployment while minimizing ground disturbance. These low-profile placements may provide a better habitat for some kinds of biodiversity but may lead to increased panel fouling or may interact with other processes in ways we do not yet understand. Irrespective of the designs deployed, such costs and benefits will need to be considered to optimize system





performance. Again, independent of the solar technology deployed, system designs and solar panel arrangements could be improved by adding vegetation buffers, shrub and tree rows, and other patchy vegetation clusters to increase habitat and connectivity for wildlife, production of livestock and crops, and reduce run-off and erosion. What is certain is that leaving intact or restoring vegetation clusters and corridors can increase biodiversity and have positive impacts on species richness and diversity around agricultural landscapes (Burel, 1996; Nordberg et al., 2021).

### **Summary and future directions**

Increasing the generation of renewable energy has the potential to greatly reduce carbon emissions and diminish reliance on fossil fuels, but little is yet known about the effect of this expanding industry on the landscapes on which generation facilities are built or the biodiversity associated with these sites and the ecosystem services they provide. We are similarly ignorant of how to minimize these impacts or access the potential for better environmental and commercial returns that could be realized through better design of solar facilities in association with other land uses such as agriculture or conservation. It is clear, however, that the potential exists for increased net returns from co-locating power generation, agricultural production, and land restoration and conservation. To understand the size of this potential opportunity, studies quantifying the direct and indirect effects of solar farms on biodiversity and agricultural production, and vice versa, are needed. There is urgency in this need for greater understanding, especially given the current rapid growth of solar farm construction. As our knowledge of how to access these opportunities expands, the placement of new solar farms should be carefully considered to minimize negative effects on ecological communities, as should the co-location of new facilities within existing disturbed agricultural landscapes. Designing mosaics of land uses that provide multiple economic benefits to multiple industries will reduce the negative effects of multiple land uses and provide enhanced revenue for multiple industries, both through reduced maintenance costs and increased production. By designing future solar farms in partnerships with solar farm developers, agriculturalists, economists, and conservation ecologists, we can achieve more sustainable and regenerative outcomes for environmental, agricultural, and power generation.

### **Discussion**

A growing number of public and media relations companies are working on solar farm developments and proposals for a range of clients, and this work embraces managing communication activities, community engagement, awareness-raising campaigns, informing and shaping public opinion, working with farmers and land owners to help them realize the potential of solar farm development, helping to position local authorities as leaders in the renewable energy sector, working to attract investment into solar farms, and overcoming community opposition to specific developments. A few simple illustrative examples give some impression of the nature of this work. Collings and Money, for example, claims to offer a full marketing and communication service to solar farm developers, including marketing and communications



strategy and planning, copywriting and the dissemination of press releases, securing editorial opportunities in the trade press, negotiating and implementing advertisement campaigns, managing advertisement schedules, securing speaking engagements at conferences, managing participation at exhibitions and designing and managing print and online marketing materials. Athene Communications worked with Lark Energy on community engagement for the large solar farm development at Wymeswold mentioned earlier. In reporting on this project, Athene Communications (2013) emphasized that Lark Energy's belief that *'with the solar industry under continuing time pressure because of frequent changes in clean energy support rates....a proactive approach to community engagement and stakeholder management made all the difference to ensure smoother planning process.'* Athene's approach to the project included community audits, a statement of community engagement, the delivery of a preplanning application engagement and consultation program, feedback to the community, and a troubleshooting service. The community audits, for example, focused on research designed to help demonstrate an understanding of local people's opinions and align engagement with their interests, while troubleshooting involved providing mediation services to proactively manage objectors within a community.

Within the US, Solargen Energy has worked with a strategic communications company, Passantino Andersen, to help overcome community opposition to the development of a solar farm in the remote Panoche Valley in San Benito County in northern California. The site of the proposed development was a traditional haven for bird watchers and a few kilometers from a number of small organic farms. Local farmers and wildlife and environmental groups campaigned against the proposal, and the developers and Solargen engaged Passantino Andersen to address the campaigners' concerns, build alliances, and mobilize supporters to overcome opposition influence and create a political climate that would favor timely government approval. The communications company conducted public opinion research designed to identify likely supporters and opponents and the issues of importance to both audiences, looked to develop compelling messages that would help to foster a sense of ownership for the solar farm amongst the target audiences, offer something of value to the area that it would not otherwise receive and to keep communications constant and consistent in order to maintain control over the debate. In devising its messaging, for example, given the high unemployment rate within the county,

Passantino Andersen stressed the importance of the economic benefits the solar farm would generate and the developer's commitment to provide \$10 million to offset property tax exemption. At the same time, government decision-makers were fully briefed on opinion poll research results, the benefits of the proposed development, stakeholder engagement, and levels of public support in an attempt to build and maintain their confidence.

More specifically, Collings, Cottrell, and Leopold (2013) made seven recommendations for communications strategies in the renewable energy sector, namely that:

- development of renewable energy campaigns should be approached as a process with clearly defined stages
- partnering and pooling resources should be undertaken more often to increase funding for renewable energy communication campaigns
- pre-campaign research in renewable energy communications should be more thorough and aimed at getting a better understanding of public opinion about renewable energy
- behavioral economics findings should be applied to the development of renewable energy communications
- more innovative and emotive messaging of renewable energy communications would elicit more positive responses
- ongoing and post-campaign evaluation should be consistently applied for quality control at all stages of renewable energy communication processes
- communication strategies should be more proactive in responding to negative media coverage of renewable energy.'

In Concluding Their Study, Collings, Cottrell, And Leopold (2013) Suggest That An International Survey Designed To 'Identify Specific Misconceptions Held By A Range Of Population Segments' And The Development Of 'A Communications Knowledge Platform For Renewable Energy To Pool Information And Knowledge From A Number Of Stakeholders' Would 'Have The

Potential To Bring Significant Practical And Theoretical Contributions To Overcoming Current Renewable Energy Communication Challenges.

## CONCLUSION

The aim of such type of township (solar farm) is to become self-independent on electricity requirements along with distribution of it and also to learn optimum usage of energy of daily requirements in terms of electricity, water, food, land, and proper distribution of work. In the future, It will help the group (or society) to be energy-independent, financially independent, and food-independent, improve eating habits and work culture, make life simple and better, and improve the standard of living in a hygienic condition.

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## HISTORY OF UZBEK LANGUAGE IN AFGHANISTAN (FROM THE TIMURIANS OF HERAT TO THE BEGINNING OF THE 21ST CENTURY)

**Assadullah Qatey**

Samangan Higher Education Institute

[Assadullah786qatey@gmail.com](mailto:Assadullah786qatey@gmail.com)

**Muhibullah Mahboob**

Samangan Higher Education Institute

[Mohibullahmahboob92@gmail.com](mailto:Mohibullahmahboob92@gmail.com)

**Shejauddin Hanif**

Sar-e-pul Higher Education Institute

### ABSTRACT

Afghanistan, which was known as Khorasan and Ariana in previous centuries, has been inhabited by different ethnic groups and tribes since ancient times. In Afghanistan, there is a vast land called Turkestan, as its name shows that the Turkish peoples i.e. (Uzbeks and Turkmens) live in it, but so far there has been less talk about the Uzbeks of Afghanistan and their language. The Uzbek language belongs to the eastern branch of Turkish languages, Turkish languages are part of the great family of Altaic languages, Turkish language was born in Iran, Afghanistan and Tajikistan with the emergence of Qarakhanians and Ghaznavians, and with the passage of time and the continuation of the rule of Turkish dynasties and The Turkish speakers flourished (Sabaghi, 2020, p. 4). The history of calligraphy and ancient literary and written works of the Uzbek language goes back to the inscriptions of "Orkhon Yenisi". These petroglyphs were obtained from the shores of the Orkhon seas in Mongolia, Yenisei (Ana-sai, meaning the mother valley) in southern Siberia, Talas in Kyrgyzstan and other areas such as Eastern Turkestan, Central Asia, the Caucasus, the Volga coast and parts of Europe (Vafai, 2008, p. 13).

**Keywords:** history, language, Turkish-Uzbek, Timurians and Afghanistan.

### Introduction

Language is an important and essential part of culture, and as a cultural tool, it causes the transfer of cultural heritage from one generation to another. Political boundaries are also mainly aligned with linguistic boundaries.

The country of Afghanistan has been the birthplace of culture and civilization for many years, and the various ethnic groups of this land have played a key role in the development and growth of this culture and civilization. Along with other ethnic groups living in Afghanistan, Turkish-speaking poets, writers and politicians, namely Uzbeks and Turkmens have played a special role in enriching the culture and especially literature of Afghanistan, which can be

mentioned by Mawlana Jalaluddin Muhammad Balkhi, Amir Ali Sher Nawai, Zahieruddin Muhammad Babar, Shahrukh Mirza and Gowharshad Begum.

In order to explain the ability of the Turkish-Uzbek language, Amir Ali Shir Nawai wrote the book (The Trial of Alghatin) in order to prove the superiority of the Uzbek language over the Persian language, and Mahmoud Kashghari also wrote the Al-Turk Dictionary of Turkish Words so that the Turkish words would not be lost, it is worth mentioning that the authors of Turkey has prepared and published a list of the words of the Al-Turk Glossary book separately (Kashghari, 1996, p. 15). The Uzbek language became especially popular in Afghanistan with the support and tact of Amir Ali Shirnawai, the most prominent, or in other words, the most influential Uzbek-Turkish poet and writer (Tuxtun et al., 2004, p. 40).

In the same way, by creating works in the Turkish-Uzbek language, Zahieruddin Babur not only takes a worthy participation in its progress and development, but also performs unforgettable services for the culture of Turkish speakers. Babur's scientific, literary and cultural heritage has not lost its scientific and historical importance and beauty even today, indeed, his masterpiece, the Baburnama, stands as one of the invaluable cultural treasures of the world (N.M. Meleh Yaif, 2000, p. 807). The Uzbek language is one of the important and living languages of the region and the world, which has an ancient history. This language includes the large family of Turkish languages, which has its roots in the languages of the Altai group, the word Uzbek is a newly emerging term, and today it is used instead of the term (Eastern Turkish) in Uzbekistan and Afghanistan. The Uzbek language is the official language of Uzbekistan and has several million speakers in Afghanistan and Tajikistan, and Uzbeks also live in all Central Asian countries and some countries in the world.

After Uzbekistan, Afghanistan is the second country in whose constitution Uzbek is registered as the official language in the regions where Uzbeks are the majority, and the Uzbek language of Afghanistan is also called the South Uzbek language.

### **Stages of Uzbek Language Development:**

The development and evolution of the Uzbek language has passed through at least three important historical periods, which we will briefly mention.

#### **1- Ancient Turkish Period**

The history of ancient Turkey goes back to centuries BC (Before Crist) and covers up to the 10th century AD. The oral works of the ancient Turks and the inscriptions of "Orkhon Yinisi" and other written works in wood, pottery and other objects that have been discovered from different regions of Asia and Europe belong to the language of the ancient Turkish period. The most important of them are the inscriptions of the tombs of the Turkish khaqans and princes, which were obtained from the shores of the Orkhon Sea in northern Mongolia and the shores of the Yenisei Sea in southern Siberia at the end of the 19th century (Poppe, 1960, c 45).



These writings, which are all in Turkish-runic script (cryptic), were first read by the Denmark scientist and expert V. Thoms and then by the Russian expert R. Radlov and others.

## 2- Old Turkish Period

This period of the Turkish language includes the 11th and 14th centuries, in which there are lasting scientific-literary works such as "Divan Loghat al-Turk" by Mahmoud Kashghari, "Qutdgho Bilik" (Blessed Knowledge) by Yusuf Khas Hajeb, "Hebat al-Haqayq" by Ahmed Yogenki, "Divan Hikmat" by Khwaja Ahmad Yesavi, "Qasses al-Anbiya" by Rabghuzi, "Golestan Balturki" by Saif Saraei and "Mohabatnama" by Khwarazmi and the works of Sufi Allahyar have appeared.

## 3- The New Period of the Uzbek Language

This development period of the Uzbek language began in the 20th century. Countless scientific and literary texts were written in this period. In the first half of the 20th century, the first Uzbek novel "Ottgan Konler" i.e. Past Days was written by the famous Uzbek writer Abdullah Qaderi. So far, dozens of lasting literary works of Uzbek authors have been translated into several living and valid languages of the world.

Along with Istanbul Turkish, Azerbaijan Turkish, Kazakh and Uyghur language, Uzbek language is one of the Turkish languages in the world, which has more than 10 million speakers, and the rest of the Turkish languages have less than ten million speakers (Imaq, 2014, p. 15).

Today, the Uzbek language has a better position in the region and the world. Currently, about 50 million people on Earth speak the Uzbek language. Uzbek writers produce hundreds of literary works in this language every year. There are Uzbek language research centers in some universities and scientific centers of influential countries in the world such as America, Britain, France, Italy, Germany, Switzerland, China, Japan, South Korea, India, etc. Uzbek language schools have been established in more than 100 countries. More than forty decades have passed since Uzbek is the official language of Uzbekistan. Afghanistan is the second country in whose constitution Uzbek is registered as an official language in areas where Uzbeks are the majority (Kohken, 2018, pp. 3-5).

## The Origin of the Turkish-Uzbek Language

The Uzbek language is one of the important languages of the Altaic or Ural-Altaic branch from a relative and genealogical point of view, and the first signs of its ancient and so-called pre-Turkish variety date back to the third century BC (Before Crist). The oldest surviving works in this language are Orkhon and Neesi inscriptions (Hazaei, 2003, p. 177). The source of origin and the starting point of the dispersion of the Turks and the roots of the Turkish-Uzbek language is in Central Asia, in the region of the Altai Mountains, which is the border between northwest China, Mongolia, southern Russia, and the eastern corners of Kazakhstan, therefore Turkish, Mongolian and Tungusic languages are called Altaic languages. Because the origin of all these language groups is from this region (Abbas Javadi, 2021, p. 15).

### Uzbek Turks in Afghanistan

Afghanistan Uzbeks are counted as the third largest ethnic group after Pashtuns and Persian speakers. Most of the Uzbeks of Afghanistan live in the north and some in the west of Afghanistan, but they live scattered in most of the provinces of Afghanistan. The history of Afghanistan shows that this country was generally under the rule of the Turks until the rule of Ahmad Shah Abdali in the 18th century. Ghaznavians, Saljuqians, Khwarazm Shahians, Timurians, Shibani Uzbeks and Afshars, all of whom were from the Turkish people who ruled Afghanistan, and the Uzbeks are also the survivors of these dynasties (Fawzi, 2012, p. 550).

A large number of historical monuments of Afghanistan were created by the ancestors of Uzbeks of Afghanistan. (Timziork, 2016, p. 160).

### Turkish-Uzbek Language in the Timurian era

The Timurians dominated in Afghanistan in the late 14th century, and it was during this period that Chaghtai Turkish literature (now Uzbek) appeared in the Herat city of Afghanistan under the leadership of Amir Ali Shir Nawai and Timuri King Sultan Hossain Baiqra. Chaghatai language and literature spent its most brilliant period in the era of Amir Ali Shirnawai (1501-1441) and became the literary language of this region. At the end of his life, Nawai wrote the book *Muhakemata al-Ghatin* for the comparison of Persian and Turkish languages, and in it, to prove the superiority of Turkish language over Persian, he has given evidence of the richness of similar Turkish verbs and words. Chaghatai Turkish (Uzbek) is influenced by Southern Turkish, especially Azari dialect, and the reason for that was the contact and communication between cultural centers such as Tabriz, Shirwan and Herat at that time, in such a way that Azari poets, writers and artisans gathered in Herat and Herat School has been the Academy of Fine Arts and Sciences.

Sultan Hossain Baiqra, who was Nawai's childhood friend, was born in 1438 in Herat (one of the current cities of Afghanistan) and sat on the throne in 1469 in Herat, and Herat became the cultural center of the East. Baiqra worked hard for the development of the Eastern Turkish language and issued an order to write in Turkish. His services in the development and evolution of Persian and Turkish-Uzbek language and literature are valuable. Hossain Baiqra also writes poetry in Turkish-Uzbek language, his time is called (golden era of Turkish-Uzbek literature) (Hielt, 2001, p. 91).

After the Herat Timurians, Zahieruddin Mohammad Babur, one of the descendants of Timur, founded the Baburyan government in Afghanistan and carried out activities for the development and flourishing of the Turkish-Uzbek language, and he personally wrote works in the Turkish-Uzbek language, as pointed to his Baburnama. In the 16th century, Babur is considered the representative of Turkish-Uzbek literature. Besides writing Turkish-Uzbek best poems, he also created the best examples of Turkish prose and played a prominent role in the promotion and development of Turkish literature. Baburnama which was description of his memories from Turkish-Uzbek language view is a masterpiece and one of the world classics in terms of content. Babur's poems were published in Petrograd in 1917. In short, the Chaghtai Turkish

language gave its existence to modern Uzbek in the 18th century (Paiman, 2022, pp. 3-1).

Many works in Turkish-Uzbek language were created during the era of Herat's Timurian in Afghanistan. The lasting works of Lotfi Heravi, Amir Alishir Nawai, Sultan Hossain Baiqra, Atai Balkhi, Hamedi Balkhi and others were created in Balkh and also in Herat, which was the capital of the Timurian Empire. Mr. Hamedi created his poem story "Yusuf and Zulaikha" in Turkish language in Balkh, Zahieruddin Mohammad Babar wrote some of his poems and literary works in Kabul and invented Baburi script in this land.

Alishir Nawai and the unique scientific and literary creations of this great personality shine like a bright star in the sky of regional and world literature. The greatest and richest classic works of Uzbek literature were created in the Timurian era of Herat (Taxtan, 2006, p. 13).

### **The Situation of the Uzbek Language in Afghanistan between the 20th and 21st Centuries**

After the fall of Timurian rule in Herat, the long period of stagnation of Uzbek language and literature begins in this land. Following the fall of the rule of Sultan Hossain Baiqra, this irreplaceable supporter of civilization and culture, the brilliant literary environment of that era also disappears. Uzbek language and literature can no longer flourish in this land. After Zahieruddin Mohammad Babur, Uzbek language has gone through a bitter time in our country. Uzbek language was disrespected by the rulers of the time after the Timurians and Baburs, and no effective work was done for its development. The printing of Uzbek works and publications in Uzbek language faced many problems during the Seduzai rule.

Until the last half century, Uzbek children were deprived of the blessing of education in their mother tongue in Afghan schools, the works of Uzbek poets: such as Amir Alishir Nawai, Ahmad Yesavi, Sufi Allah Yar, Mashreb, Howaida and the stories of Uzbek poems of Yusuf Zalaikha, from Baba Roshan and Amir Hamza Sahib-e-Qeran was read only in mosques and monasteries by the children of Turkish tribes, in the same way, the conditions were not ready for the publication of Uzbek books and works. Literary writings of Uzbek writers were not published in governmental newspapers and magazines. Uzbek poets and writers wrote their works in Uzbek language to be published in magazines, but not much attention was paid to the publication of the works of Uzbek and Turkmen writers and poets. For the first time in 1967 the complete collection of Sultan Hossain Baiqra's poems was published by the Afghan History Association due to the efforts of academician candidate Dr. Mohammad Yaqub wahedi Jozjani (Barzegar, 2019, p. 4).

### **The First Steps for Publishing the Uzbek Language in the Media**

In the 13th session of the National Council, the representatives of Uzbeks and Turkmen of Afghanistan tried to open a way for Uzbek and Turkmen language broadcasts on Afghanistan Radio. In 1971, broadcasts in Uzbek and Turkmen languages began for the first time on Radio Afghanistan. And these publications continued until the middle of 1973. After the military coup of 1975, when Mohammad Davoud took over the government affairs, for unknown reasons, the

broadcasts of Radio Afghanistan in these two languages were stopped and it was not revived until the fall of Mohammad Davoud's government. Following the coup of 1978, when the pro-Soviet People's Democratic Party of Afghanistan came to power, Radio Afghanistan broadcasts in Uzbek and Turkmen languages started again, and these broadcasts were 30 minutes a day for each language. In the middle of 1987, the first government publication named "Yoldoz" (star) in Uzbek and Turkmen languages was published in Kabul. After a few months, another magazine called "Gunesh" (sun) started publishing in Turkmen language, and "Yoldoz" was published in Uzbek language in Kabul for about ten years. In the recent years of Dr. Najibullah's rule, this magazine was moved to Mazar-e-Sharif and became the publication organ of the Ministry of Tribal Peoples. After the fall of Dr. Najibullah's rule, Yolduz publications were published under the support of "National Islamic Movement of Afghanistan" in Mazar-e-Sharif in the form of a magazine with a small section using the limited facilities of the local printing press.

During the years of rule of the People's Democratic Party of Afghanistan, the ground was provided for publishing books and works of Uzbek writers. The collection of poems of Uzbek poets was published by the Union of Writers. "Khamsa" by Amir Alishir Nawai, the book of Zahieruddin Muhammad Babur's poems, the poems of Mrs. Nadera and other books were published in Kabul. After the fall of Dr. Najibullah's rule, the forces of the National Islamic Movement of Afghanistan were got the control of the northern provinces for several years. In these years, Andisha, Yaghdo, Toghri Yul, Bidar, and "Voice of Islam" magazines were published in Mazar-e-Sharif, and "Jozjanan" in Sheberghan, and "Faryab" and "Qoyash" were published in Maimana, and some parts of these magazines were in Uzbek language.

In recent years, after the establishment of the republic period, the Ministry of Information and Culture published publications in the Uzbek language within the framework of the "Watandar" publications, and for whatever reason, the Uzbek section of the "Watandar" publication did not reach to the literate and educated Uzbek community (Kohken, 2018, p. 5).

During the rule of President Hamid Karzai and Mohammad Ashraf Ghani, some private media also dedicated a part of their broadcasts to Uzbek language. Local radios and televisions in the northern provinces broadcast in Uzbek. This is a positive development and a valuable step for the development of the Uzbek language. But the content of the Uzbek publications of all these media is debatable and it is beyond the scope of this article.

### **Uzbek Language in Schools**

For the first time, education in Uzbek language started in Afghanistan schools after the revolution of 1987. The Ministry of Education created the Department of Uzbek Authoring and Translation and appointed a number of Uzbek professors to write textbooks in Uzbek language. Up to the fourth grade, all lesson topics were written and printed under the supervision and advice of Dr. Aref Osman Ouf, the Uzbek consultant of the Ministry of Education, and teaching in Uzbek language began in the schools of Uzbek-populated areas.



This program did not have a good result. The Ministry of Education did not publish Uzbek language and literature textbooks for middle and high school classes. Students who were taught in Uzbek until the fourth grade, had to study in Persian in the fifth grade. This problem caused the Uzbeks to no longer show much desire to learn in their mother tongue. This program was a good start, but it had a disappointing ending. Teaching in the mother tongue for Afghanistan Uzbek children was no longer continued.

During the administration of Hamid Karzai, the Ministry of Education of Afghanistan introduced the Uzbek language education system in the schools of the Uzbek-populated areas. The Ministry of Education published Uzbek language books up to the sixth grade. Unfortunately, the lack of formation for Uzbek language teachers in schools, the non-inclusion of graduates of the Uzbek language and literature departments of universities and teacher training institutions in teacher recruitment exams, and the non-inclusion of Uzbek language lessons in the education curriculum were among other problems that Ministry of Education did not solve them (Ebrahim, 2013, p. 2).

### **Uzbek Language in Universities and Academic Institutions:**

The Department of Uzbek language was opened for the first time in 1983 at the Faculty of Language and Literature of Kabul University. This department continued its activity until the end of Dr. Najibullah's rule in (1992). With the beginning of the civil wars, the door of the Uzbek department in Kabul University was closed and it was not active for nearly three decades. In the Department of Uzbek Language and Literature of Kabul University, in addition to the local professors, several professors specializing in Uzbek language and literature from the Soviet Republic of Uzbekistan were teaching at the time.

Dozens of students, most of whom were Uzbeks, graduated from this department, some of them started teaching Uzbek language in universities and teacher training institutes in the northern provinces of the country, and still there are some Uzbek teachers who are busy in teaching Uzbek language in the universities of northern Afghanistan.

During the Republic period, about 7 departments of Uzbek language and literature began to operate in the universities of the northern provinces of the country and are still operating, and with the Department of Uzbek language and literature of Kabul University, the number of active departments of Uzbek language and literature in the country are eight departments. In the same way, during the Republic period and before that, Uzbek language and literature departments were established in the teacher training institutions of nine northern provinces of the country, but unfortunately, there were problems in the process due to the lack of sufficient and up-to-date teaching materials and the lack of harmony in the curriculum between the departments, there was problems in the procedure of education, and the lack of expert professors with master's and doctorate degrees also kept the level of educational efficiency in these departments at its lowest level, and with the return of the Islamic Emirate, the offices of teacher training institutions were removed by the Ministry of Education.

As mentioned, Uzbek language has the most speakers in Afghanistan after Persian (Dari) and Pashto languages. Currently,





Uzbeks of Afghanistan live in almost half of the country's provinces. The Uzbek language, as an important element of Afghanistan's connection with Turkish-speaking countries, especially Uzbekistan, has provided good opportunities for regional convergence for our country, and this language has a high capacity for development in Afghanistan. In recent years, new opportunities have emerged for the cultivation and development of the Uzbek language (Kohken, 2018, p. 3).

### **Status of the Uzbek Language during the Reign of Mohammad Ashraf Ghani:**

Mohammad Ashraf Ghani, the President of the Republic of Afghanistan, during his presidency, has repeatedly mentioned the richness and importance of the history of Uzbek language in the region. During his presidency, he took steps to improve the position of the Uzbek language in Afghanistan. The beginning of publications of the presidential palace and some government offices in Uzbek language and the approval of the "National Day of the Uzbek Language" in Afghanistan can be considered as symbolic steps to improve the position of the Uzbek language.

In the autumn of 2019, October 20 was recognized as the national day of the Uzbek language in Afghanistan. In a meeting with President Ghani and the leadership of the government, representatives of a number of Afghanistan Uzbeks cultural organizations proposed to name this day as the National Uzbek Language Day in Afghanistan, which was accepted by President Ashraf Ghani and the cabinet was approved it in a meeting and thus this day was included in the official calendar of this country.

In 2019, the Presidential Palace of Afghanistan held a commemoration ceremony for the first time to celebrate this day.

But with the victory of the Islamic Emarat again in 2021, the Uzbek language has once again been neglected. Now it is necessary for the elders of the Uzbek people to take other decisive steps to remove the factors that have hindered the development of the Uzbek language and pay attention in order to institutionalize the position of the Uzbek language in the country as the language of a significant and influential part of the population of Afghanistan.

**Result:** Examining the situation of the Turkish-Uzbek language in recent centuries in Afghanistan shows that it has not been given as much attention as it should have been, and no important measures have been taken for the development of this language.

The period of growth and prosperity of the Turkish-Uzbek language in Afghanistan goes back to the era of the Timurian of Herat, headed by Amir Ali Shir Nawaii, Zahieruddin Mohammad Babur and Gowharshad Begum, who did important work in this field for the development and prosperity of this language and the works Especially Amir Ali Shir Nawaii and Zahieruddin Mohammad Babur wrote a valid book in Turkish-Uzbek language and made it available to the Turkish speakers of the region.

Uzbek language writers and poets until the time of Amir Ali Shir Nawaii had not benefited from the richness of the Turkish-Uzbek language and its wide possibilities in a fundamental way, the treasures of this language were kept hidden, but. Amir Ali Shir Nawaii began his journey as an

author, creating valuable works in Turkish-Uzbek language that ultimately propelled him to great renown as an esteemed poet and author. His literary contributions have earned him a high standing in the hearts of the Turkish community, cementing his place as a revered figure in their cultural heritage.

After the fall of Timurians' rule of Herat, the long period of stagnation of Uzbek language and literature begins in Afghanistan, after the fall of the rule of Sultan Hossain Baiqra, this irreplaceable supporter of civilization and culture, the brilliant literary environment of that era also disappears. Uzbek language and literature can no longer flourish in this land.

Undoubtedly, in the last centuries, the Turkish-Uzbek language in Afghanistan has been disrespected by the government from every point of view, and the statesmen have not done anything important for the growth and prosperity of this language. According to the constitution of Afghanistan during the Republic period, after Pashto and Persian (Dari) languages, Uzbek language is recognized as the official language in the Uzbek nation regions of Afghanistan, and according to this, Uzbek language should be taught in public schools and universities in the Uzbek-populated areas. According to this law, the Islamic Emarat of Afghanistan must provide education for children in their mother tongue, but unfortunately, linguists and cultural experts consider all these factors to be the neglect of the Islamic Emarat towards the Uzbek-Turkish language.

In 2012, the Ministry of Education of Afghanistan printed books in Uzbek language and sent them to some Uzbek provinces, including some areas of Balkh province. But unfortunately, the way of writing and compiling these books was objected by a number of Afghanistan Uzbek cultural experts and linguists. One of the professors of Uzbek-Turkish language at Kabul University said: "Some special words of Uzbek language are not included in the book, the grammar is not observed and the sentences are incomplete in terms of grammar and syntax, and in some places words are misplaced."

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## HARBIY TA'LIM MUASSASALARIDA KURSANTLARNI HARBIY VATANPARVARLIK RUHIDA TARBIYALASHNING PEDAGOGIK VA PSIXOLOGIK XUSUSIYATLARI

**B. T. Xaitov**

Chirchiq OTQMBY Gumanitar fanlar kafedrası katta o'qituvchisi

### ANNOTATSIYA

Ushbu maqolada harbiy ta'lim muassasalarida kursantlarni harbiy vatanparvarlik ruhida tarbiyalashning pedagogik va psixologik xususiyatlari haqida fikrlar bildirilgan. Butun dunyoda yoshlar va ularning vatanparvarlik sifatlariga ochiqdan-ochiq tahdidlar ortib borilayotgani va ularga qarshi kurashish lozimligi uqtirilgan.

**Kalit so'zlar:** harbiy vatanparvarlik, ta'lim-tarbiya, harbiy vatanparvarlik motivlari, harbiy vatanparvarlik sifatleri.

### ABSTRACT

This article comments on the pedagogical and psychological features of the education of cadets in military educational institutions in the spirit of military patriotism. All over the world, open threats to youth and their patriotic qualities are being raised and the need to be combated.

**Keywords:** military patriotism, education, military patriotic motives, military patriotic qualities.

### KIRISH

Mamlakatimiz mustaqillikka erishgan ilk kunlardan harbiy ta'lim muassasalarida kursantlarni harbiy vatanparvarlik ruhida tarbiyalash, uning pedagogik va psixologik asoslarini ishlab chiqish hamda amaldagi ta'lim mazmuniga singdirish kun tartibidagi dolzarb masalalardan biriga aylandi. Mazkur masala mustaqillik, ozodlik, hurlik, erkinlik, davlat va jamiyat rivojini ta'minlovchi lokomotivlardan biri ekanligiga alohida e'tibor qaratila boshlandi.

Xususan, bo'lajak ofitserlarda harbiy vatanparvarlikni nafaqat ta'lim va tarbiya orqali singdirish, balki ajdodlarimizdan bizga meros qolgan millatimizning ma'naviy va moddiy qadriyatlarini asrab avaylash, davlatimizda bunyod etilayotgan zamonaviy bino va inshootlardan faxrlanish tuyg'usini tuyish, mazkur bino va inshootlar, davlat va jamiyatimizning bir bo'lagi hamda kelajak avlod uchun bugungi milliy bunyodkorlik tafakkuri va ma'naviy ongimizdan dalolat beruvchi manbalardan biri ekanligi pedagogik jihatdan singdirilib, psixologik jihatdan motivatsion drayver sifatida e'tirof etilgan.

“Bugungi kunda yoshlarni harbiy-vatanparvarlik ruhida tarbiyalash, ularning fuqarolik pozitsiyasini mustahkamlash juda muhim vazifadir.

Mintaqamiz va dunyodagi vaziyat tobora keskinlashib bormoqda. Milliy xavfsizligimiz, tinch va osoyishta hayotimizga nisbatan taxdid va xatarlar kuchaymoqda.

Shu bois hushyorlik va ogohlikni oshirish, o‘zaro hamjihatlik va birdamligimizni mustahkamlash, har qanday tahdidlarga munosib javob berishga tayyor bo‘lib yashash hayotning o‘tkir zaruratiga aylanmoqda” [1], deb ta’kidlaydi Prezidentimiz Sh.M.Mirziyoyev.

### ADABIYOTLAR TAHLILI VA METODOLOGIYA

Hozirgi sharoitda harbiylarda Vatanni sevish, milliy qadriyatlarimizga, boy va buyuk tariximizga cheksiz hurmat va bu bilan faxrlanish, xalqimizga xos bo‘lgan oilaning muqaddas deb bilish, o‘zidan kattalarga nisbatan hurmat, kichiklarga mehr va e’tibor tuyg‘ularini kamol toptirish juda muhim [2-131].

Bizga ma’lumki, davlat va jamiyatda qayta qurilish yoki bir davrdan ikkinchi bir davrga o‘tishda ma’naviy omil bilan bog‘liq bo‘shliqlar, yot kuchlar tomonidan boshqa manbalar bilan to‘ldirilishiga doimiy harakat amalga oshiriladi. Xususan, mustaqillikning ilk davrida G‘arbning “ma’naviy qadriyatlari”, “demokratiya” tushunchalari va tamoyillari ostida har xil oqimlarning kirib kelishi, dunyoviy manfaatlarning milliy va etnik axloqiy va diniy qadriyatlardan ustuvorliklarini “rang barang” qilib ko‘rsatish nafaqat vatanparvarlik tuyg‘ulari shakllanayotgan yoshlar, qolaversa, bo‘lajak ofitserlarning faoliyatiga “soya” solib, ularni ongi va tafakkurini tom ma’noda o‘zlariga xayrixohlik elementlari bilan to‘ldirishga urinishlar kuzatiladi.

Ma’lumki, harbiy vatanparvarlik g‘oyalari millatimiz va xalqimiz tarixida muhim o‘rinlardan birini egallagan va hozirgi vaqtda ham dolzarb masalalardan biri bo‘lib qolmoqda. Davlat va jamiyatning tarixiy rivojlanishi shuni ko‘rsatadiki, vatanparvarlikning roli va ahamiyati tarixning keskin burilishlarida, jamiyatda amalga oshirilayotgan tub islohotlarda, davlatchilikni shakllantirishda, turli bosqinlar davrida, milliy ma’naviy va madaniy qadriyatlarni saqlab qolishda, chetdan turib qo‘zg‘atilgan milliy va etnik mojarolar davrida, din bilan bog‘liq fundamental va ekstremistik oqimlarning g‘alayonli namoyishlarida, tabiiy va boshqa ofatlarda obyektiv tendensiyaning ta’minlab, fuqarolarning jismoniy va ma’naviy kuchini birlashtirishga hamda bir millat va uyushgan xalq sifatida anglangan faoliyat sari muvofiqlashgan harakatlar koordinatsiyasini ta’minlashda ustuvor masala bo‘lib xizmat qilgan.

Harbiy vatanparvarlik barcha kishilar, xalqlar, millatlar uchun umumiy bo‘lgan, asrlar davomida sayqallanib kelgan





umuminsoniy tuyg‘u, ma’naviy qadriyatlardan biridir. Tarixiy jihatdan harbiy vatanparvarlik kishilarning o‘z Vatani taqdiri bilan bog‘liq bo‘lgan ijtimoiy rivojlanish, xalqlarning o‘zlari yashayotgan hududning daxlsizligi va mustaqilligi yo‘lidagi kurash jarayonida takomillashib kelgan his-tuyg‘ular majmuidir. Harbiy vatanparvarlik, vatanning o‘tmishi va hoziri bilan faxrlanishda, uning manfaatlarini himoya qilishda namoyon bo‘ladi. Darhaqiqat, sharaflilik va oliyjanob bo‘lgan burchni bajarish, har bir insonni yurtini asrab-avaylash, e‘zozlash, uning kelajagi uchun qayg‘urishga, xalqiga, prezidentiga sodiq xizmat qilish, davlatning obro‘-e’tiborini mustahkamlash, qadr-qimmatini saqlash, jamiyatda yuzaga kelgan ijtimoiy-iqtisodiy muammolarni muvaffaqiyatli hal qilishda muhim ahamiyat kasb etadi [3].

Shu nuqtai nazardan, bugungi kunda kursantlarning harbiy vatanparvarlik tarbiyasi harbiy ta’lim muassasasi faoliyatining muhim va ustuvor yo‘nalishi hisoblanadi. Kursantlar shaxsida shakllantiriladigan harbiy vatanparvarlik tarbiyasi ularda Vatanni sevis, uning har bir sarhadi va chegaralarini himoya qilish, suverenitetini asrab avaylash hamda mustaqilligining ishonchli kafolati hisoblanadi. Shuningdek, kursantlar shaxsida shakllantiriladigan harbiy vatanparvarlik tuyg‘usi uning barcha faoliyat turida dominant bo‘lib, o‘zini to‘liq namoyon qilish hamda yosh askarlar va qo‘l ostidagi shaxsiy tarkib uchun ideal shaxs qiyofasini gavdalantirib, kasbiy faoliyat uchun zarur bo‘lgan fazilatlarni qaror toptirishga xizmat qiladi.

Ta’lim-tarbiya jarayonida singdiriladigan harbiy vatanparvarlik tarbiyasi kursantlarning kelajakda shaxsiy va kasbiy faoliyatiga bevosita ta’sir ko‘rsatib, ular uchun keladigan shaxsiy va kasbiy muammolarning konstruktiv yechimini topishda asos bo‘ladi.

So‘nggi yillarda, butun dunyoda yoshlar va ularning vatanparvarlik sifatlariga ochiqdan-ochiq tahdidlar ortib borilayotganini kuzatish mumkin. Bugungi kunda yoshlarning ongi va tafakkuriga “egallik” qilish, ularni o‘z ona Vatani va xalqiga emas, balki boshqalarni manfaatiga xizmat qildirish yuzasidan bir qator xorijiy mamlakatlarning “ideolog va psixolog mutaxassisleri” tomonidan “yumshoq pedagogik yondashuv” hamda “sivilizatsiyalashgan ta’lim-tarbiya” borasidagi targ‘ibot va tashviqotlari tobora faollashmoqda. Informatsion jamiyatda yashayotganligimiz nuqtai nazaridan, global tarmoqdagi informatsiyalarni cheklash yoki nazorat qilish imkoniyati ancha past. Shu nuqtai nazardan, bu kabi tahdidlar harbiy ta’lim muassasalarida tahsil olayotgan yoshlarni ham chetlab o‘tmasligi tabiiy holdir. Kursantlarni harbiy vatanparvarlik ruhida tarbiyalash xorij “mutaxassisleri” tomonidan amalga oshirayotgan “miya chayish” operatsiyalariga nisbatan immunitetni shakllantirishga xizmat qiluvchi asosiy pedagogik-psixologik omil bo‘lib hisoblanadi.

Mazkur masalada Y.A.Tyugashev ilmiy mulohazalari o‘rinli bo‘lib, uning nuqtai nazaricha, bugungi kunda yosh avlod ongida hayot maqsadi va mazmunini yo‘qotishga, shaxsiy faoliyatdagi qiyinchiliklarning yuzaga kelishi boshqalar haqidagi g‘amxo‘rlik omili ekanligi, undan qutilish uchun shaxs o‘zini o‘ylashi kerakligi yuzasidan “miya chayish” yoki “miya oqish” operatsiyalari xorij “mutaxassis”lari tomonidan faol olib borilmoqda. Bu operatsiyaning taktik maqsadi nafaqat yoshlarga, balki bo‘lajak ofitserlar faoliyatiga ham ta’sir ko‘rsatish ustuvor masala etib belgilangan bo‘lib, davlatning mudofaa qobiliyati, fuqarolarining xavfsizligi, Vatanni himoya qilish, ertangi kunga bo‘lgan ishonch hissini pasaytirish hamda harbiy vatanparvarlik tuyg‘usini yo‘qotishdir [4].

Kursantlarda harbiy vatanparvarlikni shakllantirishda asos bo‘luvchi tizimli pedagogik yondashuvning tarkibiy qismi kasbiy bilim, ko‘nikma, malaka va o‘quv jarayonining yo‘nalganligi hamda harbiy jangovar faoliyatda amaliy tajribani muvaffaqiyatli namoyon etish bilan belgilanadi. Shuningdek, kursantlarning kasbiy bilimlariga harbiy jangovar tayyorgarlik, maxsus harbiy tayyorgarlik, maxsus harbiy psixologik tayyorgarlik va boshqalar kiradi. Kursantlar tomonidan mazkur kasbiy bilimlarni egallashda pedagogik ta’lim va tarbiya muhim ahamiyat kasb etib, uning negizida texnologik va tashkiliy, kommunikativ munosabat va o‘quv jarayonini yuqori darajada o‘zlashtirish hamda harbiy vatanparvarlik fazilatlarini qaror toptirish samaradorligi ortadi.

## NATIJALAR

Kursantlarni harbiy vatanparvarlik ruhida tarbiyalashda motivlar muhim ahamiyatga ega bo‘lib, ulardan foydalanishning psixologik jihatdan kombinatsion muvofiqligini ishlab chiqish, mexanizmni yaratish har bir davr uchun muhim masala bo‘lib kelgan.

Kursant shaxsida shakllanadigan harbiy vatanparvarlikning motivi har qanday shaxsiy, amaliy va moddiy manfaatni inkor etib, haqiqiy ma’noda davlat va jamiyat uchun mustahkam “qo‘rg‘on” va “buzilmas “qal’a” vazifasini o‘taydi.

Zamonaviy harbiy ta’limda kursantlar shaxsida shakllanadigan harbiy vatanparvarlikning motivlari quyidagilar bilan tavsiflanadi:

- Vatan va yurt himoyasi uchun harbiy operatsion va rasmiy vazifalarni bajarishda harbiy qasamyod va burchlilik mas’uliyati nuqtai nazaridan anglangan faoliyat turi sifatida yondashish;

- harbiy kasbiy faoliyat hamda shaxsiy vatanparvarlik sifatlarini yuqori darajada o‘z shaxsida qaror toptirish asosida topshirilgan taktik va strategik harbiy topshiriqlarni fidokorona amalga oshirish;

- Vatan xavfsizligi va chegaralar daxlsizligini ta'minlash hamda suverenitetini saqlashda shaxsiy javobgarlik va burchlilikni anglash, doimiy shaylikning yuqori darajadagi tayyorgarlik holati;

- Vatanga muhabbat va sadoqat, qo'l ostidagi askar va serjantlarga kasbiy va shaxsiy ibrat namunasi bo'lish hamda sharaflı burchni ado etishda mardlik va jasorat ko'rsatish.

Mazkur motivlar kursantning shaxsiy va kasbiy faoliyat jarayonida bir-biri bilan bog'liq bo'lib, xulq-atvorning ichki mexanizmlarini o'zida aks ettiradi. Harbiy ta'limda kursantlar shaxsida shakllanadigan harbiy vatanparvarlikning motivlarini pedagogik usul va texnologiyalar asosida tizimli amalga oshirish hamda ichki muvofıqlıknı ta'minlash muhim ahamiyat kasb etadi.

Harbiy ta'lim muassasalarida vatanparvarlikning motivlarini pedagogik usul va texnologiyalar asosida tizimli amalga oshirish mamlakat manfaatlari va qadriyatlarini himoya qiladigan yuqori bilim va ko'nikmaga ega bo'lgan bo'lajak ofitserlarnı tayyorlash zaruratidan kelib chiqadigan zamonaviy yondashuv hisoblanadi. Kursantlarda harbiy vatanparvarlikning motivlarini pedagogik usul va texnologiyalar asosida tizimli amalga oshirish zamonaviy harbiy ta'lim va tarbiyani tashkil etishda muhim rol o'ynaydi. Mazkur yondashuv kursantlar shaxsida shakllanadigan harbiy vatanparvarlik tarbiyasining asoslarini, o'quv jarayonida professional tartıbda shakllantirish va rivojlantirish omillarini hamda harbiy vatanparvarlik qadriyatlarining poydevorini yaratishning pedagogik imkoniyatlarini yuzaga chiqaradi.

## MUHOKAMA

Yangi O'zbekistonning zamonaviy harbiy ta'lim muassasalarida kursantlarnı harbiy vatanparvarlik ruhida tarbiyalashning pedagogik tizimini takomillashtirish, innovatsion o'qitish texnologiyalarini o'quv jarayoniga realizatsiya etish davlat va jamiyatning ustuvor vazifasiga aylanmoqda. O'zbekiston Respublikasi Prezidenti, Qurollı Kuchlar Oliy Bosh Qo'mondoni Sh.M.Mirziyoyev o'z nutqida yoshlarnı vatanparvarlik ruhida tarbiyalash uzluksiz olib boriladigan ishlarning negizi, davlat hayotining ma'naviy asosi hisoblanishi hamda jamiyatni har tomonlama rivojlantirish borasida eng muhim safarbar etuvchi kuch sifatida namoyon bo'lishi lozimligini hamda kadrlar masalasi, qo'shinlarnı zamonaviy qurol-yarog'lar bilan ta'minlash, harbiy xizmatchilarnı ijtimoiy himoya qilish, harbiy xizmatchilarnı harbiy vatanparvarlik ruhida tarbiyalashga taalluqli muammolar ta'lim va tarbiya jarayoni bilan bevosita bog'liqligiga to'xtalib, ularni o'z vaqtida bartaraf etish masalasiga e'tibor qaratgan [5].

Jamiyatimiz yoshlarida Vatanga daxldorlik hissini kuchaytirish maqsadida O'zbekiston Respublikasi Vazirlar Mahkamasi tomonidan "2023-2027-yillarda yoshlarni harbiy-vatanparvarlik ruhida tarbiyalash ishlari samaradorligini oshirish konsepsiyasi" qabul qilindi. Konsepsiyaning 2-bob 6-bandida yoshlarni milliy g'oya va Vatanga sadoqat ruhida tarbiyalash, ularning qalbi va ongiga Vatan himoyasi sharaflari va muqaddas burch ekanligini singdirish, qadimiy tariximiz va madaniyatimiz, Vatanimizning mustaqilligi va ravnaqi yo'lida fidokorona kurashgan milliy qahramonlarimiz bilan faxrlanish, ularga munosib bo'lish tuyg'usini shakllantirish, milliy armiyamizning qudrati va salohiyatiga bo'lgan ishonchni kuchaytirish masalasi pedagogik-psixologik jihatdan yoritilgan [6].

Oliy Bosh Qo'mondonning harbiy vatanparvarlik yuzasidan bildirgan nutqi va O'zbekiston Respublikasi Vazirlar Mahkamasining 2023-yil 29-iyundagi 267-sonli Qarorida belgilangan vazifalar kursantlarni harbiy vatanparvarlik ruhida tarbiyalashning pedagogik texnologiyalarini ilmiy nuqtai nazardan o'rganish va zamonaviy yondashuvlarni ta'lim jarayonida qo'llashni taqozo etadi.

Harbiy oliy ta'lim muassasalarida bilim olish va o'zlashtirishga qaratilgan faoliyat sog'lom munosabatlar hamda imkoniyatga ega bo'lish bilan bog'liq modellashtirish omillariga muvofiqlashib, anglangan faoliyatni mazmuniga aylanadi hamda kursantlar va ofitserlar munosabatining mohiyatini belgilaydi. Muayyan faoliyat informatsion va emotsional funksiyalarni bajarib, kommunikativ munosabatlarni tartibga soluvchi faollikning motivatsion idealini boyitadi. Faollikning motivatsion idealining barqarorlashuvi munosabatlar muvofiqligini yuqori cho'qqiga olib chiqqan holda kursantlarda ijtimoiy tuyg'ularni shakllantiradi hamda bilim olish, o'qib o'zlashtirish bilan bog'liq emotsional qobiliyatni ratsional qobiliyatga o'tishini ta'minlaydi. Emotsional qobiliyatni ratsional qobiliyatga o'tish jarayoni kognitiv faoliyat turini namoyon etish jarayonining yuzaga chiqishiga xizmat qilib, o'qib o'rganish bilan bog'liq xatti-harakatlarning funksionalligini ta'minlaydi va sifat bosqichga olib o'tadi. Mazkur jarayonda vatanparvarlikning shakllanishiga xizmat qiluvchi ijtimoiy-axloqiy tarbiya mexanizmi paydo bo'ladi. Ushbu mexanizm quyidagi formulaga muvofiq amalga oshiriladi:

***pedagogik tarbiya va psixologik tayyorgarlik + bilim va g'oyalar + motivlar + his-tuyg'u va munosabatlar + ko'nikma va malakalar + faoliyat va xatti-harakatlar + ijtimoiy-axloqiy fazilatlar = vatanparvarlik sifatleri***

Mazkur mexanizm oliy harbiy ta'lim muassasalari ta'lim va tarbiya jarayonida vatanparvar shaxsni tarbiyalashda muhim ahamiyat kasb etadi: unda tavsiya etilayotgan har bir komponent muhim bo'lib, ulardan hech bo'lmaganda bittasini chiqarib tashlash yoki boshqasi bilan almashtirish maqsadga muvofiq bo'lmaydi. Aksincha, uni

to'ldirish va mukammallashtirish uchun maqsad va vazifadan kelib chiqqan holda ijtimoiy-psixologik omillarga muvofiqlashgan komponentlarni zamon nuqtai nazaridan qo'shish lozim.

Bugungi kunda, kursantlarni harbiy vatanparvarlik ruhida tarbiyalashning muhim vosita va tarkibiy qismlariga shaxsga xos individual psixologik xususiyatlari, ma'naviy va axloqiy sifatlari, madaniy va ma'rifiy fazilatlarini hamda ijtimoiy-iqtisodiy, huquqiy-siyosiy ongi va tafakkurini kiritish maqsadga muvofiq bo'lib, milliy-harbiy qadriyatlarini shakllantirishga xizmat qiladi.

Kursantlarni harbiy vatanparvarlik ruhida tarbiyalashning zamonaviy shakl, usul va vositalaridan yuqori pedagogik texnologiyalar asosida foydalanish harbiy ta'lim sifatini oshirib, yuqori samaradorlikka erishish imkonini ta'minlaydi.

Shu nuqtai nazardan harbiy ta'lim muassasalari o'quv jarayonida kursantlarning shaxsiy faolligini oshirish, o'zini o'zi tarbiyalash hamda kasbiy qobiliyatini rivojlantirish bilan bog'liq psixologik yondashuvlarni pedagogik texnologiyalar negizida amalga oshirish zarur. Mazkur yondashuv pedagogik-psixologik jihatdan kursantni o'zini o'zi tarbiyalashga yo'naltirilgan maqsadli motivini yuzaga chiqarib, bo'lajak ofitserni yuqori malakali mutaxassis, professional harbiy xizmatchi hamda harbiy vatanparvar shaxs sifatida ideal komandir shaxsini qaror toptiradi. Ta'lim-tarbiya jarayonidagi pedagogik yondashuvning psixologik omillarga muvofiqlashuvi kursantlarni o'zini o'zi tarbiyalash jarayoniga ijobiy ta'sir ko'rsatib, ularni o'z ustida doimiy ishlashga, jangovar harbiy ta'lim sir-asrorlarini muvaffaqiyatli o'zlashtirishga va zamonaviy harbiy xizmatchi uchun zarur bo'lgan harbiy vatanparvarlik fazilatlarini shakllantirishga undaydi.

Yosh avlodni har tarafloma sog'lom va barkamol qilib tarbiyalash g'oyat murakkab va uzoq vaqtni talab qiladigan jara'ndir. Farzand tarbiyasi hech qachon bizni kutib turmaydi. Ayniqsa bugungi g'oya va mafkuralar kurashi avj olgan bir paytda, kelajak avlod tarbiyasi har qachongidan ham muhim hisoblanadi. Yoshlar tarbiyasiga beparvolik, loqaydlik kelajakda tuzatib bo'lmas og'ir oqibatlarga olib kelishi mumkin. Agar bu vazifani biz bugundan boshlab, e'shlarimiz qalbi va ongida ezgulik g'oyalarini, yuksak axloqni, e'shi ulug' insonlarga hurmatni shakllantira olsak nafaqat o'zimiz, balki jamiyatimizning rivojiga ulkan hissa qo'shgan bo'lamiz [7].

## XULOSA

Xulosa qilib aytganda, kursantlarni harbiy vatanparvarlik ruhida tarbiyalash harbiy pedagogika va harbiy ta'lim tizimining muhim omili bo'lib, ularda kasbiy va shaxsiy natijaga erishish hamda serjant va askarlar uchun namunali ofitser shaxsni shakllantirishda alohida ahamiyatga ega. Shuningdek, kursantlarni harbiy vatanparvarlik ruhida





tarbiyalashning psixologik imkoniyatlari, pedagogik usul va vositalari professional harbiy ofitser va yuqori malakali mutaxassislarni milliy axloqiy qadriyatlarga muvofiq tayyorlashning asosi bo'lib, harbiy ta'lim muassasalarida ilmiy-ma'naviy muhit ustuvor ekanligidan dalolat berib turadi.

Muhtaram Prezidentimiz ta'kidlaganlaridek: “tomirlarida buyuk bobolarimizning qoni oqayotgan yoshlarimiz ulug' ajdodlarimizning munosib vorislari bo'lishi, ular kabi ulkan maqsadlar sari intilib yashashi va yuksak marralarga erishishi uchun barcha zarur shart-sharoitlarni yaratishimiz zarur. Yangi O'zbekiston yoshlari ana shunday yuksak darajalarga ko'tarilishi uchun barcha imkoniyatlarni ishga solamiz” [1].

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## ИСПОЛЬЗОВАНИЕ ФИТОТЕРАПИИ В ЛЕЧЕНИИ СЕРДЕЧНО-СОСУДИСТЫХ ЗАБОЛЕВАНИЙ (ОБЗОРНАЯ СТАТЬЯ)

**Ж. А. Миррахимов, Н. О. Эргашева**

Центр развития профессиональной квалификации медицинских работников,  
Ташкент, Узбекистан

### АННОТАЦИЯ

Традиционно для профилактики/лечения сердечно-сосудистых заболеваний (ССЗ) использовались растительные лекарственные средства (РЛС). Их использование неуклонно растет, и многие пациенты с ССЗ часто сочетают РЛС с назначенными сердечно-сосудистыми препаратами. Интересно, что до 70% пациентов не информируют кардиологов/врачей об использовании РЛС, и до 90% кардиологов/врачей не могут регулярно спрашивать об их использовании. Существует ограниченное количество научных доказательств из хорошо спланированных клинических испытаний, подтверждающих эффективность и безопасность РЛС, и поскольку они не снижают заболеваемость и смертность, они не рекомендуются в клинических руководствах по профилактике/лечению ССЗ. Также существует значительная путаница в отношении идентификации, активных компонентов и механизмов действия РЛС; отсутствие стандартизации и контроля качества (загрязнение, фальсификация) являются другими источниками беспокойства. Более того, широко распространенное мнение о том, что, в отличие от рецептурных препаратов, растительные лекарственные средства (ТЛС) безопасны, вводит в заблуждение. Некоторые ТЛС могут вызывать клинически значимые побочные эффекты и взаимодействия, особенно при использовании с узкотерапевтическими сердечно-сосудистыми препаратами (такими как антиаритмические средства, антитромботические средства, дигоксин). Кардиологи/врачи больше не могут игнорировать эту проблему. Они должны улучшить свои знания о ТЛС, потребляемых их пациентами, чтобы предоставлять более качественные рекомендации и предотвращать побочные реакции и лекарственные взаимодействия. В этом обзоре рассматриваются предлагаемые клинические применения и безопасность наиболее часто используемых ТЛС, подчеркивая решающую роль кардиологов/врачей в защите потребителей и решении ключевых проблем и пробелов в доказательствах, связанных с использованием ТЛС для профилактики и лечения сердечно-сосудистых заболеваний.



**Ключевые слова:** фитотерапия, сердечно-сосудистые заболевания, нетрадиционная терапия, патология, диагностика, атеросклероз, гипертония, лекарственные растения, антиоксиданты, окислительный стресс, воспаление

## ВВЕДЕНИЕ

Сердечно-сосудистые заболевания (ССЗ) - это состояния, которые поражают сердце или кровеносные сосуды. Ежегодно ССЗ приводят к более чем 17 миллионам смертельных случаев во всем мире, что делает их основной причиной смерти во всем мире. Это накладывает значительное экономическое и медицинское бремя на общества во всем мире. Всемирная организация здравоохранения (ВОЗ) сообщила, что ССЗ составляют 31% всех смертей каждый год во всем мире [1]. В Европе ССЗ являются причиной 45% всех смертельных случаев, как указано в Европейской статистике сердечно-сосудистых заболеваний за 2017 год [2]. По данным Американской кардиологической ассоциации, примерно половина населения Соединенных Штатов в настоящее время борется с той или иной формой ССЗ [3].

Сердечно-сосудистые заболевания охватывают широкий спектр состояний, включая заболевания периферических сосудов, ишемическую болезнь сердца (ИБС), сердечную недостаточность, инфаркт миокарда, инсульт, кардиомиопатии, дислипидемию и гипертонию, среди прочих [4, 5]. ССЗ в первую очередь являются результатом сосудистой дисфункции, приводящей к повреждению органов. Например, сердце может перенести сердечный приступ, в то время как мозг может перенести инсульт из-за сосудистого нарушения. Атеросклероз, тромбоз и высокое кровяное давление являются ключевыми факторами сосудистой дисфункции. Распространенными факторами риска сердечно-сосудистых заболеваний являются курение, нездоровое питание, диабет, гиперлипидемия, повышенный уровень холестерина липопротеинов низкой плотности (ЛПНП-Х), сниженный уровень холестерина липопротеинов высокой плотности (ЛПВП-Х) и гипертония.

## АНАЛИЗ ЛИТЕРАТУРЫ И МЕТОДОЛОГИЯ

Профилактика сердечно-сосудистых заболеваний облегчается путем поддержания здорового эндотелия сосудов. Здоровый эндотелий проявляет сосудорасширяющие, антиатерогенные и противовоспалительные свойства. Несколько факторов риска сердечно-сосудистых заболеваний приводят к дисфункции эндотелиальных клеток, которая считается ключевым событием в патогенезе атеросклероза, коронарной вазоконстрикции и потенциально ишемии миокарда.



Интересно, что дисфункция эндотелиальных клеток является обратимым явлением, открывающим двери для терапии сердечно-сосудистых заболеваний, основанной на ее обращении.

Недавние исследования подтвердили, что воспаление является фактором риска сердечно-сосудистых заболеваний, особенно в случаях атеросклероза и ишемической болезни сердца. Повышенные уровни высокочувствительного С-реактивного белка (hs-CRP) и/или интерлейкина-6 (IL-6) связаны с более высоким абсолютным сердечно-сосудистым риском. Исследование CANTOS продемонстрировало снижение сердечно-сосудистых событий после терапии анти-интерлейкином-1 бета (IL-1 $\beta$ ) независимо от уровня холестерина [6]. Кроме того, общие факторы риска сердечно-сосудистых заболеваний, такие как диабет или гипертония, могут предрасполагать людей к сердечно-сосудистым заболеваниям через воспаление [7].

Например, в случае атеросклероза воспаление может привести к дисфункции ЕС. Дисфункциональные ЕС допускают накопление частиц липопротеинов низкой плотности (ЛПНП) в интима стенки сосуда, где они модифицируются в окисленные ЛПНП. Окисленные ЛПНП затем могут активировать дисфункциональную ЕС для высвобождения молекул клеточной адгезии (VCAM-1 и ICAM-1), которые связываются с воспалительными лейкоцитами (Т-клетками и моноцитами) и привлекают их в субэндотелиальное пространство [8]. Эти воспалительные клетки крови секретируют интерлейкины и цитокины, продуцируют активные формы кислорода (ROS) и, таким образом, создают воспаленную микросреду внутри артериальной стенки. Воспаленная микросреда способствует пролиферации гладкомышечных клеток сосудов (VSMC), расширению матрикса и отложению липидов, что приводит к образованию атеросклеротической бляшки. Моноциты могут достигать интимы сосудов, дифференцироваться в макрофаги и поглощать окисленные вещества.

Гипертония, также известная как высокое кровяное давление, является сердечно-сосудистым заболеванием и основным фактором риска развития других сердечно-сосудистых и несердечно-сосудистых заболеваний (2017). Гипертония является независимым предрасполагающим фактором сердечной недостаточности, ишемической болезни сердца, инсульта, ретинопатии, нефропатии и заболеваний периферических артерий [9]. Большинство этих состояний связаны с высокими показателями смертности и заболеваемости [10]. Кроме того, гипертония является единственным наиболее значимым фактором риска атеросклероза и любого клинического исхода атеросклероза. Гипертонию часто называют «тихим убийцей», поскольку она не проявляет симптомов до поздних



стадий заболевания. Неудивительно, что около 1,4 миллиарда человек страдают от гипертонии, и ежегодно она становится причиной около 9,4 миллиона смертей.

Несмотря на достижения в лечении сердечно-сосудистых заболеваний, эти состояния продолжают уносить больше жизней, чем все формы рака, вместе взятые [11]. В последние годы были предприняты значительные усилия по профилактике сердечно-сосудистых заболеваний [12]. Поэтому срочно необходимы новые варианты лечения для всех типов сердечно-сосудистых заболеваний, учитывая, что продолжающееся бремя, вызванное этими состояниями, остается значительным.

Терапевтическое использование травяных и растительных продуктов.

Изучение традиционной медицины и этнофармакологии, определяемое как исследование традиционных средств, практикуемых различными этническими группами, является таким же древним, как и сама история человечества. Традиционная медицина исторически опиралась на природные ресурсы в качестве средств. На протяжении всей истории травы, обычно определяемые как любая форма растения или растительного продукта [5, 10, 12], и растительные экстракты составляли основу первых лекарств, используемых в системах традиционной медицины многих культур и цивилизаций. Растения и травы всегда были общим источником лекарств, либо в форме традиционных экстрактов, либо в виде чистых активных соединений [1, 2]. Очевидно, что природа является важнейшим источником для открытия новых лекарств, которые способствуют лечению болезней. Известные лекарства, полученные из травяных и растительных источников, включают аспирин из дерева *Salix alba* L., дигоксин (сердечный гликозид) из *Digitalis purpurea*, ловастатин из *Monascus purpureus* L., таксол из *Taxus brevifolia*, резерпин из *Rauvolfia serpentina* и многие другие. Примечательно, что резерпин продолжает оставаться эффективным средством лечения гипертонии. В частности, открытие противомаларийных препаратов, таких как хинин из коры видов *Cinchona* и артемизинин из *Artemisia annua* L., служит ярким примером того, как этнофармакология может влиять на открытие лекарств [6, 9].

Современная медицина: лечение атеросклероза и гипертонии.

Современные руководящие принципы здравоохранения подчеркивают важность профилактики для минимизации риска сердечно-сосудистых заболеваний [12]. Это достигается путем устранения ключевых факторов риска сердечно-сосудистых заболеваний и попыток минимизировать их неблагоприятные последствия. В случае атеросклероза большинство терапевтических подходов



сосредоточены на контроле гипертензии и гиперлипидемии или модулировании гемостаза для предотвращения тромботических осложнений. Гиперхолестеринемия является основным фактором атеросклероза, поэтому современные традиционные терапевтические подходы в значительной степени полагаются на снижение уровня ЛПНП с помощью статинов [6, 12]. В случаях, когда терапия статинами не приводит к значительному снижению уровня ЛПНП, можно использовать ингибитор абсорбции ЛПНП, как отдельно, так и в сочетании со статинами в зависимости от реакции пациента. Клинические испытания показали многообещающие результаты в этом отношении.

Недавно ингибиторы PCSK9 были одобрены регулирующими органами в качестве варианта лечения для снижения уровня холестерина ЛПНП, особенно для пациентов с сердечно-сосудистыми проблемами, которые неэффективно реагируют на статины [6, 7]. Клиническое исследование CANTOS (2017) показало, что люди с повышенным уровнем воспаления ( $hsCRP > 2$  мг/л) могут получить пользу от комбинированной терапии статинами и канакинумабом (антителом к  $IL-1\beta$ ) для снижения риска атеросклероза [6, 7, 12]. До рекомендаций исследования CANTOS традиционные подходы к лечению игнорировали роль воспаления в атеросклерозе (Weber and Noels, 2011). Важно отметить, что комплементарная и альтернативная медицина (КАМ), включая фитотерапию, уже давно изучали воспалительный аспект атеросклероза, прежде чем за ними последовали основные исследования.

Основные классы лекарств, доступных для лечения гипертензии, включают тиазидные диуретики, ингибиторы ангиотензинпревращающего фермента (АПФ), блокаторы рецепторов ангиотензина II и блокаторы кальциевых каналов [13]. Вазодилататоры, антагонисты альдостерона,  $\beta$ -блокаторы,  $\alpha$ -блокаторы, ингибиторы ренина и центрально действующие агенты - это другие агенты, которые иногда используются [14]. Эти агенты снижают артериальное давление у пациентов и уменьшают риск сердечно-сосудистых событий, связанных с гипертензией, но не предотвращают их, что оправдывает использование комбинированной терапии гипертензии [15].

Несмотря на доступность вышеупомянутых препаратов в современных системах здравоохранения, высокое кровяное давление можно контролировать только у 34% пациентов. Этот аспект в основном связан не только со стоимостью антигипертензивных препаратов, но и с их наличием и доступностью, их неблагоприятными побочными эффектами и низкой приверженностью пациентов к назначенной дозировке. По этим причинам пациенты с гипертензией ищут комплементарную и альтернативную медицину (КАМ),

особенно средства на основе трав для лечения сердечно-сосудистых заболеваний в целом и гипертонии в частности [16].

Лечение атеросклероза и гипертонии с помощью фитотерапии.

Растительные экстракты и их производные обладают потенциалом позитивно модулировать и в конечном итоге усиливать молекулярные события, которые способствуют гипертонии или атеросклерозу, двум ключевым факторам сердечно-сосудистых заболеваний. Растительные средства содержат многочисленные биоактивные соединения и, следовательно, обладают мультимодальными клеточными механизмами действия. Фактически, растительные средства могут проявлять антиоксидантное, вазорелаксирующее, противовоспалительное, антипролиферативное или мочегонное действие. Кроме того, растительные средства могут предотвращать фенотипическое переключение VSMC, ингибировать эндотелиальную дисфункцию, активацию тромбоцитов, перекисное окисление липидов, генерацию ROS и атерогенность макрофагов.

Благодаря широкому спектру молекулярных и клеточных мишеней растительные препараты могут использоваться для лечения и контроля различных сердечно-сосудистых заболеваний. Например, *Salvia miltiorrhiza* (красный шалфей), однолетнее растение, традиционно используемое в китайской медицине, использовалось для лечения многочисленных сердечно-сосудистых заболеваний, таких как ишемическая болезнь сердца, инфаркт миокарда, атеросклероз и стенокардия. Активные соединения в основном получены из высушенного корня и корневища растения, известного как Дань Шень. Биоактивные соединения растения состоят из липофильных таншинонов и гидрофильных фенолов [17]. Экстракты *S. miltiorrhiza* продемонстрировали мощные антиоксидантные свойства с высокой способностью удалять свободные радикалы, что, по-видимому, лежит в основе его сильного кардиозащитного и сосудисто-защитного потенциала.

Сальвианоловая кислота В, чистое соединение, извлеченное из *S. miltiorrhiza*, была признана эффективной против фиброза и ишемически-реперфузионного повреждения. Danshen проявляет защитное действие против неблагоприятных эффектов, вызванных гомоцистеином, где дисбаланс гомоцистеина является высоким фактором риска сосудистых заболеваний. В сочетании с *Pueraria montana* var. *lobata* (кудзу) Danshen продемонстрировал мощный антигипертензивный эффект [18]. В клиническом исследовании капсулы Danshen (1000 мг два раза в день в течение 12 недель) значительно снизили систолическое артериальное давление и частоту сердечных сокращений у пациентов с

неконтролируемой легкой и умеренной гипертонией, даже при традиционном антигипертензивном лечении. Лекарство хорошо переносилось и считалось безопасным для пациентов с гипертонией.

*Astragalus membranaceus* (также известный как *Astragalus propinquus* Schischkin в списке растений Ботанического сада Миссури) — еще одна китайская трава, которая содержит астрагалозид IV, основное биологически активное соединение растения, широко используемое в качестве антиоксиданта и для защиты от сердечно-сосудистых заболеваний, связанных с ишемией. Исследования показали, что экстракт *A. membranaceus* поддерживает функцию сердца, улучшая энергетический обмен и подавляя образование свободных радикалов в модели реперфузии миокарда во время ишемии. Снижая уровни маркера окислительного стресса малонового диальдегида (МДА), усиливая активность супероксиддисмутазы (СОД) и уменьшая повреждение клеток миокарда, вызванное свободными радикалами, *A. membranaceus* также может улучшать функцию сердца и обеспечивать кардиопротекцию в модели ишемии миокарда у крыс [19]. Экстракт *A. membranaceus* также проявляет ангиогенные эффекты.

## РЕЗУЛЬТАТЫ И ОБСУЖДЕНИЕ

*Allium sativum* (чеснок) - классический пример трав, используемых при лечении сердечно-сосудистых заболеваний, известный своими многогранными свойствами против состояний, связанных с сердечно-сосудистыми заболеваниями, такими как гипертония, окислительный стресс, воспаление и гиперлипидемия [20, 21]. Действительно, за счет снижения общего уровня холестерина и ЛПНП, снижения содержания липидов в артериальных клетках и ингибирования пролиферации гладкомышечных клеток в кровеносных сосудах чеснок может использоваться для лечения атеросклероза и гиперлипидемии [22]. Благодаря своей вазорелаксирующей способности, модулируемой эндотелиальной NO-синтазой (eNOS), *Crataegus oxyacantha*.

Общее название боярышник - еще один пример трав, обычно используемых для лечения гипертонии. Другая трава, *Crocus sativus* (шафран), может блокировать каналы  $Ca^{2+}$  через эндотелий-независимые механизмы, обеспечивая еще один сосудорасширяющий механизм в дополнение к своей способности активировать eNOS [23]. Среди других лекарственных растений известно, что *Hibiscus sabdariffa* (розелла) снижает артериальное давление, ингибируя АПФ, в то время как экстракты *Camellia sinensis* (чай) могут снижать гипертонию, значительно увеличивая расширение плечевой артерии, опосредованное потоком

(FMD) [24]. Розмарин (*Rosmarinus officinalis*) проявляет нейропротекторное действие, действуя против церебральной недостаточности, связанной с ишемическим инсультом, характеризующимся снижением локализованного кровотока в мозге. Благодаря своим противовоспалительным свойствам розмарин может помочь снизить гипертонию. Использование травяных растений распространяется на сердечно-сосудистые заболевания и предсердные аритмии. Дигиталис, извлеченный из высушенных листьев наперстянки обыкновенной, является мощным ингибитором  $\text{Na}^+/\text{K}^+$ -АТФазы и может вызывать деполяризацию, приводящую к сокращению гладких мышц и вазоконстрикции, тем самым усиливая сокращения сердечной мышцы [25].

Учитывая все эти восстановительные свойства, неудивительно, что растительные средства все чаще используются в доказательной медицине для профилактики и/или лечения сердечно-сосудистых заболеваний.

Хотя травы широко используются как в традиционной, так и в современной медицине, существует ограниченное количество обзоров, которые собирают их и тщательно фокусируются на механизмах их действия и безопасности в контексте сердечно-сосудистых заболеваний. Многие растительные соединения, по-видимому, обладают сердечно-сосудистыми защитными эффектами; однако среди наиболее эффективных соединений находятся флавоноиды, терпеноиды, сапонины и полисахариды.

## ЗАКЛЮЧЕНИЕ

Фитотерапия, или траволечение, представляет собой лечение с использованием лекарственных растений. Эта практика широко распространена в различных культурах и традиционной современной медицине. В настоящее время фитотерапия признана эффективным дополнением практически ко многим заболеваниям, включая сердечно-сосудистые.

Фитотерапия может сыграть решающую роль в предотвращении сердечно-сосудистых заболеваний, таких как гипертония, атеросклероз, ишемическая болезнь сердца и т. д. Многие лекарственные растения основаны на этом, способствующем снижению кровяного давления, подтверждению кровообращения, снижению уровня холестерина и т.д.

Таким образом, фитотерапия может быть дополнительным дополнением к каждому отдельному сердечно-сосудистому заболеванию.

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## ЗАВИСИМОСТЬ ЧАСТОТЫ ВРАЩЕНИЯ РАБОЧЕГО БАРАБАНА ДИЭЛЕКТРИЧЕСКОГО СЕПАРАТОРА ОТ ВАРИАЦИИ ЕГО РАДИУСА, МАССЫ ЛЕТУЧЕК И НАПРЯЖЕНИЯ

**Фаррух Фаридович Рахматуллинов**

Ташкентский институт текстильной и легкой промышленности,  
fara\_tashkent13@mail.ru

### АННОТАЦИЯ

Основным показателем диэлектрического сепаратора является производительность при четком разделении летучек хлопка-сырца в зависимости от их зрелости. Производительность сепаратора изменяется в основном изменением частоты вращения рабочего барабана диэлектрического сепаратора летучек хлопка. Рассмотрено влияние основных параметров сепаратора на частоту вращения барабана.

**Ключевые слова:** диэлектрический сепаратор, летучки хлопка, частоту вращения барабана.

### ABSTRACT

The main indicator of a dielectric separator is its performance in clearly separating raw cotton depending on their maturity. The productivity of the separator changes mainly by changing the rotation speed of the working drum of the dielectric separator. The influence of the main parameters of the separator on the drum rotation frequency is considered.

**Keywords:** dielectric separator, raw cotton, drum rotation frequency.

### ВВЕДЕНИЕ

Обычно пряжа высокого качества производится из волокон с высокими физико-механическими показателями. Поэтому волокно более высокого качества имеет более высокую цену. Встаёт вопрос, возможно ли из имеющихся волокон производить пряжу лучшего качества. Наиболее простой путь достижения этого является рассортировка волокон по тому или другому показателю. Иначе говоря, для улучшения качества пряжи выравнивают отдельные показатели свойств волокна, так например, рассортируют волокна по их длине, т.е. уменьшают неровноту по длине и соответственно получают пряжу лучшего качества. Достигая высокой равномерности волокон по длине, необходимо обратить внимание также и на неровноту по степени их зрелости. Если она будет высокой,



то пряжу лучшего качества прясть невозможно, т.к. от зрелости волокна зависит разрывная нагрузка пряжи. Неравномерные по зрелости волокна будут вызывать выработку пряжи с высокой неровнотой по разрывной нагрузке, что безусловно снижает качество пряжи. Поэтому ведутся научные работы, в которых исследуются возможности выравнивания степени зрелости хлопкового волокна.

Качество получаемой пряжи зависит от зрелости волокон летучек хлопка. Также зрелость волокон влияет на определение сорта хлопкового волокна [1]. Если пряжу получают из волокон хлопка с различной зрелостью, то пряжа получается с различной ровнотой, и низкими характеристиками. Поэтому используют различные конструкции сепараторов, позволяющие сортировать летучки хлопка по зрелости волокон. Нами разработана новая конструкция диэлектрического сепаратора [2].

## ПОЛУЧЕННЫЕ РЕЗУЛЬТАТЫ

Для оценки влияния основных параметров и силы прижатия на частоту вращения барабана в основном будем рассматривать условие равновесия летучки хлопка под действием силы тяжести летучек, силы притягивания и центробежной силы летучек. Так как, при неподвижной летучки на поверхности барабана сила инерции в относительном движении не будет, кроме того из-за незначительности упругой силы и силы трения их не учитывали. При этом получим следующее уравнение равновесия летучки:

$$F_{\text{эл}} - G - \frac{mV^2}{r} = 0 \quad (1)$$

Тогда с учетом коэффициента трения летучки, движущейся на поверхности вращающегося барабана и  $\omega = \pi/30$  можно записать:

$$n = \frac{30}{\pi} \sqrt{\left[ \frac{\varepsilon_0 \varepsilon_c \varepsilon_u^2 (\varepsilon_c - 1) S_n U^2 \sqrt{KC^2 - (R_{c2} - \delta)^2}}{2[KC^2 - (R_g + R_{c2})^2 + 2(R_g + R_{c2})(R_g + \delta)] \cdot \left[ \varepsilon_c d + \frac{\varepsilon_0 R_{c2} (R_g + \delta)}{\sqrt{KC^2 - (R_g + R_{c2})^2 + 2(R_g + R_{c2})(R_g + \delta)}} \right]} - G \cos \alpha \right] \frac{1}{mR}} \quad (2)$$

Численное решение уравнения (2) проводили при следующих исходных значениях параметров:

$\varepsilon_0 = 8,85 \cdot 10^{-12}$  Ф/м – электрическая постоянная;

$\varepsilon_c = 5$  – относительная диэлектрическая проницаемость семени;

$\varepsilon_u = 4$  – относительная диэлектрическая проницаемость

изоляции электродов;

$S_n = (0,1 \div 0,25) \cdot 10^{-4} \text{ м}^2$  – площадь поляризации семени;

$U$  -4-5кВ – напряжение электродов;

$R_c=3,3 \cdot 10^{-3}$  м – малая полуось семени;

$\delta=3,0$  м – половина зазора между электродами;

$R_g-3,65 \cdot 10^{-3}$ ;  $d=1,1$  мм – толщина слоя изоляции электрода;

$G = m \cdot g$  Н – сила тяжести семени;

$m$  – масса семени, кг;  $g=9,81$  м/с<sup>2</sup>.

Полученные результаты расчета частоты вращения диэлектрического барабана при вариации параметров системы приведены в таблице 1. И графически представлены на рис.1 (а и б)

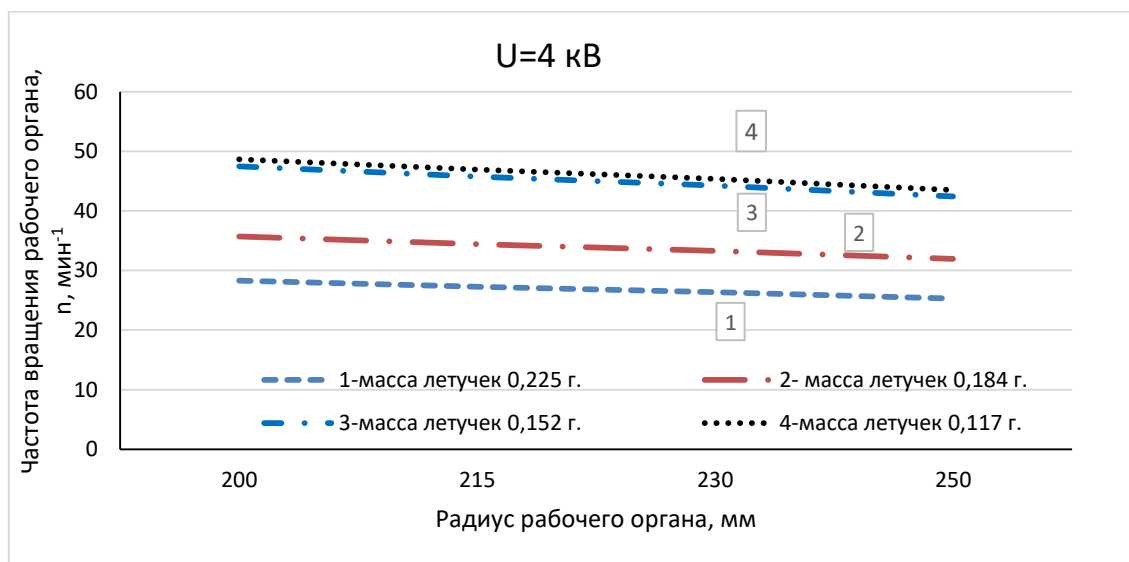
Таблица 1.

Частота вращения диэлектрического барабана при вариации параметров системы

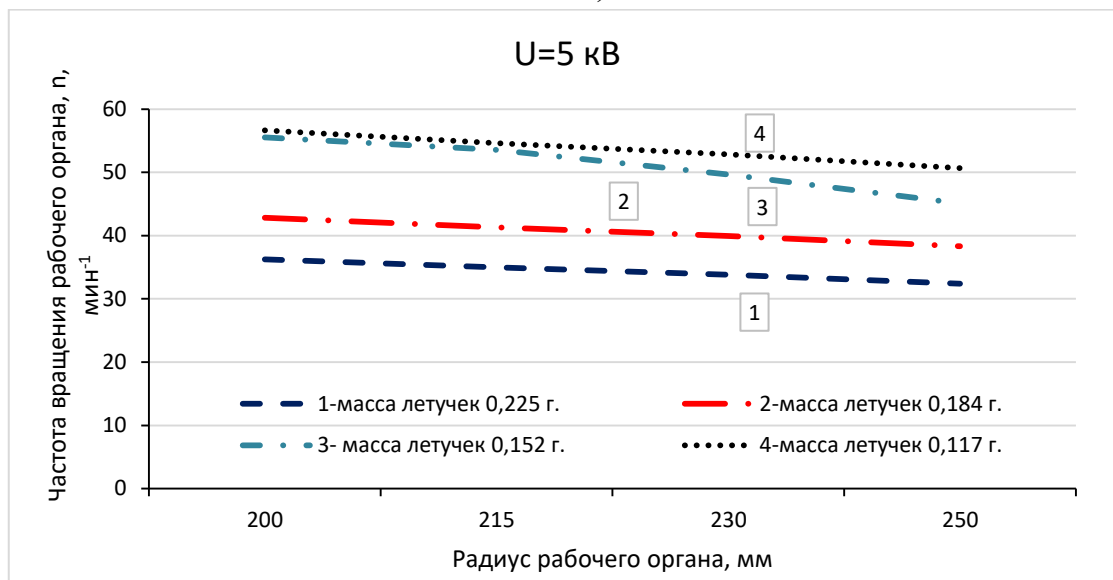
Напряжение электродов, кВ	Характеристика фракции			Радиус рабочего органа, мм			
	Номер	Средняя масса летучки, г	Угол отрыва ( $\alpha$ ) <sup>0</sup>	200	215	230	250
4,0	1	0,225	35	28,29	27,29	26,38	25,30
	2	0,184	90	35,71	34,44	33,3	31,94
	3	0,152	145	47,46	45,77	44,25	42,44
	4	0,117	180	48,64	46,91	45,36	43,50
5,0	1	0,225	35	36,24	34,96	33,80	32,42
	2	0,184	90	42,85	41,32	39,95	38,32
	3	0,152	145	55,51	53,54	49,65	45,12
	4	0,117	180	56,65	54,64	52,83	50,67

Из рис.1 видно, что уменьшая радиус барабана и повышая напряжения электродов можно увеличить частоту вращения рабочего барабана. Увеличение радиуса рабочего барабана (свыше 250мм) ведет к увеличению потребной мощности, увеличивается инерционная сила летучек, что может привести к их преждевременному выпадению, снижается четкость сепарации.

При больших радиусах рабочего барабана целесообразным считается увеличение напряжения электродов позволяющий увеличение электрического поля, при этом возрастает электрическая сила прижатия летучек хлопка к поверхности рабочего барабана.



а)



б)

где 1-масса летучек 0,225г, 2-масса летучек 0,184г, 3-масса летучек 0,152г, 4- масса летучек 0,117г.

**Рис.1. Зависимость частоты вращения рабочего барабана диэлектрического сепаратора от вариации его радиуса, массы летучек и напряжения электродов**

Из анализа данных таблицы 1 следует, что для выпадения летучек хлопка, первой фракции при повороте на  $35^0$  и напряжении электродов 4,0 кВ достаточна частота вращения рабочего барабана  $28,29 \text{ мин}^{-1}$ , а для четвертой фракции  $-48,64 \text{ мин}^{-1}$ . При частоте вращения барабана более, чем  $28,29 \text{ мин}^{-1}$  летучки 1 и 2 фракций быстрее выпадают в соответствующие ячейки. Но при частоте вращения барабана меньше  $48 \text{ мин}^{-1}$  летучки 3-4 фракций могут не выпадать и переносится обратно в рабочую зону, что нежелательно. Поэтому при радиусе барабана  $R_6=0,2\text{м}$  и напряжении электродов  $U=4\text{кВ}$  частоту вращения



необходимо выбирать в пределах  $45-48 \text{ мин}^{-1}$ . При напряжении электродов  $5,0 \text{ кВ}$  частота вращения выбирается в пределах  $50-55 \text{ мин}^{-1}$ . Это обеспечивает увеличение производительности сортировки летучек по фракциям до  $20\%$ .

### ЗАКЛЮЧЕНИЕ

Для обеспечения необходимой четкости разделения летучек по фракциям и для увеличения производительности установки на  $25-30\%$  рекомендуемыми значениями являются:  $R_b=(0,23-0,25) \text{ м}$ ;  $U=(4,0-4,5) \text{ кВ}$ ,  $n=45-50 \text{ мин}^{-1}$ .

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## MEDICINAL SIGNIFICANCE OF PRODUCING *LEVISTICUM* OFFICINALE W.D.J.KOCH

**Nazar Sarvar ugli Rustamov**

PhD, Research Institute of Plant Genetic Resources

[rustamov.nazar@bk.ru](mailto:rustamov.nazar@bk.ru)

**Khasanboy Nazarmetov**

Research Institute of Plant Genetic Resources

### ABSTRACT

Essential oils of the medicinal plant *Levisticum Officinale* W.D.J.Koch are a thick, mobile mass of red-yellow color, highly soluble in alcohol. The oil contains terpenes, terpineol, terpininuratene, terpineol-nitrol-pichericin, dihydrate, cineole, as well as acetic, iso-valeric and benzoic acids. The decoction is served when dropsy comes out, the upper passages, the gastrointestinal tract open. Cleanses the skin well, promotes healing of purulent wounds. Improves the condition of patients with rheumatism and gout. A strong diuretic. A decoction of roots and leaves is used to eliminate pigment spots on the skin. In folk medicine, the plant *Levisticum Officinale* W.D.J.Koch is used to treat nervous diseases, fever, and difficult labor. A decoction or tincture is used to wipe hair to strengthen it; fresh crushed leaves are used to relieve headaches by applying to the sore spot.

**Keywords:** oil, leaves, roots, trunk, seeds, flowers, medicine, alcohol, pigment, selection, seed production, substance, dihydrate, terpineol, cineol.

### АННОТАЦИЯ

Эфирные масла лекарственного растения *Levisticum Officinale* W.D.J.Koch представляют собой густую подвижную массу красно-коричневого цвета, отлично растворяющуюся в спирте. В состав масла входят терпены, терпинеол, терпининуратен, терпинеол-нитрол-пикерицин, диогидрат, цинеол, а также уксусная, изо-валериановая и бензойный кислоты. Отвар корня используют при лечении водянки, заболеваний верхних дыхательных путей, желудочно-кишечного тракта. Хорошо очищает кожу, способствует заживлению гнойных ран. Улучшает состояние больных при ревматизме и подагре. Сильное мочегонное средство. Отвар из корней и листьев употребляют для устранения пигментных пятен на коже. В народной медицине растения *Levisticum Officinale* W.D.J.Koch применяют для лечения нервных заболеваний, лихорадки, при затрудненных родах.

Отваром или настойкой протирают волосы для их укрепления, свежими растёртыми листьями снимают головные боли, прикладывая к больному месту.

**Ключевые слова:** масло, листья, корни, ствол, семена, цветы, лекарство, спирт, пигмент, селекция, семеноводство, вещество, диогидрат, терпинеол, цинеол

## INTRODUCTION

Plants of the celery family (Apiaceae), used in folk medicine, have a wide spectrum of action due to containing various phytochemical compounds. One of promising plants of this family is Lovage (*Levisticum Officinale*). Herbaceous perennial, polycarpic, up to 2 m high. The root is thick, taproot, brownish; caudex thick multi-headed. The stem is straight, with a bluish coating, fist-shaped, branched at the apex, at the base covered with scale-like remains of dead leaf petioles, 2–4 cm in diameter. The petioles of the lower leaves are long, glabrous, round in cross-section with a narrow notch on the adaxial side, hollow, with peripheral vascular bundles. The leaf blades are dark green, shiny, broadly triangular or rhombic in outline, complex. The leaves are large, obovate in outline, wedge-shaped at the base, entire, and coarsely incised-toothed at the apex with cartilaginous teeth at the tip. The stem leaves gradually become smaller towards the apex and become less complex. The highest seats. Heterophylly is characteristic. The flowers are collected in an inflorescence of a complex umbrella, about 12 cm in diameter, with 12–20 rough rays on the inner side and somewhat expanded at the top, 4–6 cm long. The involucre leaves are numerous, lanceolate, white-membranous along the edge, bent downward, finely ciliated along the edge, often also rough on the upper surface. Umbrellas are 5–12 mm in diameter, with 20–26 flowers. The involucre leaves are numerous, somewhat fused at the base. The petals are bright yellow, small, about 1 mm long and wide, elliptical in outline, with a very short claw at the base, slightly notched at the apex and with the apex curved inward. During flowering, the sub-columns are short-conical, later simply conical. Stylodia are short, 1.5–2 mm long, bent toward the dorsal side of the mericarp. The fruit is a yellow-brown two-seeded, elliptical, 5–7 mm long and 3–4 mm wide. Carpophorus bifid to the base. Mericarps are slightly compressed from the back, yellow-brown in color when ripe. The marginal ribs are wing-shaped, the dorsal ribs are keel-shaped. The commissary is narrow. Exocarp of small cells.

The center of origin of the species is believed to be Iran and Afghanistan. Currently, the species grows almost everywhere - on the Eurasian continent, North and South America, Africa, Australia. It is

specified that the range covers the European part of Russia and the Caucasus, Eastern Europe and Eastern Asia.

Due to pharmacological properties biologically active substances contained in various parts of *Levisticum officinale*, this the plant is increasingly used in medical practice, but as a medicinal raw materials are included in a number of European Pharmacopoeias.

Lovage is a cold-resistant plant, winters well, grows back early in the spring and forms seeds in northern regions, demanding light, moisture and soil fertility, development occurs in a two-year cycle. In the first year, a powerful rosette of leaves and a rhizome are formed, in the second year - a flowering stem and seeds. Lack of moisture leads to delayed growth, reduced yield and its quality. It is valued for its high content of essential oils, vitamins, mineral salts, as well as for its tonic effect. Lovage is propagated by seeds sown before winter or in early spring. It produces abundant self-seeding, which is transplanted into beds to grow new plants. Lovage also grows well when dividing perennial roots. If you decide to propagate this plant by seeds, do not sow randomly, but in rows, first germinating green shoots at 10-15 cm and using them as young greens. Then you can thin out the plants by 30-40 cm, gradually increasing the distance between plants and between rows to 60-70 cm. This area is enough for long-term cultivation of this large and powerful plant. In the fall, it would be good to sprinkle the plant with peat or humus. Lovage grows on different soils: clay, sand, peat, but develops more luxuriantly on breathable, moderately moist and nutritious soils. With excessive nitrogen application, the plant becomes too strong, and the root reaches large sizes, but its pulp loses density and juiciness, becomes loose, and darkens when cooked. Therefore, you should not get carried away with nitrogen fertilizers, but be sure to add potassium and microelements. Before sowing seeds, add humus or compost to the soil at the rate of 4-5 kg of compost, 15-20 g of urea, 20 g of superphosphate (ordinary) and 30 g of potassium sulfate, a glass of ash per 1 m<sup>2</sup>. Then, depending on the condition of the plant, you can carry out organic and mineral fertilizing with microelements. To grow good lovage roots, you need to remove the flower stalks in time, not allowing them to rise. Do not cut off a lot of greenery, this affects the filling of the roots. Greenery for the table will provide thinning of thickened plants. For seeds, it is enough to leave one specimen of lovage.

This same plant – tall, densely foliated, with large dark green leaves, as if polished to a shine, high yellowish umbrella-shaped peduncles – can also be decorative.

When growing lovage, only a few leaves are taken from it in the first year - for seasoning. Only in September of the

following year, the rhizomes are dug up, cleaned, strung on cords and hung to dry; larger ones are cut in half lengthwise to speed up drying. Pharmaceutical raw materials, often affected by insects and, in addition, hygroscopic, should be stored in tightly closed containers. The fruits are collected in late autumn, when they are fully ripe. Leaves for seasoning can be taken all year round. The above-ground part is taken when the roots are dug up, but dried in the air separately.

Caring for lovage includes regular loosening and weeding. If there is a lack of moisture, watering is carried out. In subsequent years, early spring fertilizing is included, which is repeated in the second half of summer. If there is no need to obtain seeds, timely breaking off of flower stalks is carried out when they reach a height of no more than 10 cm. Harvesting of products can begin in the fall of the first year, or early in the spring of the second year. During wintering, plants do not fall out due to low temperatures.

Lovage is popularly called mountain celery. Indeed, they are close botanical relatives. In the wild, lovage grew on the slopes and foothills of mountains, hence its other name - mountain celery. It also grew in lower, moist places, where it developed even more luxuriantly.

## CONCLUSION

The pharmacological action of the plant raw material of lovage is due to the presence of biologically active substances of various structures and compositions in plants. Many of them have anti-inflammatory, antibacterial, antifungal and antioxidant effects. Phthalides of lovage are also characterized by hepatoprotective properties; flavonoids have a cytotoxic effect on tumor cells, neuroprotective and antithrombotic effects, and in small concentrations they have a positive effect on the reproductive system. The properties of chlorogenic acids of lovage include antinociceptive and antihypertensive effects. Polyacetylenes are capable of suppressing the growth of tumor cells and are bioactive in relation to antiplatelet aggregation. The most significant alkaloid of plant raw materials is tetramethylpyrazine, the bioactivity of which is due to antiplatelet, anti-inflammatory and neuroprotective effects. Due to the complex of bioactive compounds and individual components isolated from various parts of lovage, which have a wide spectrum of pharmacological action, the prospect of its use in medical and pharmaceutical practice can be outlined.

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## SIGNIFICANT FEATURES OF SALVIA OFFICINALIS L. FOR MEDICINAL PURPOSES

**Nazar Sarvar ugli Rustamov**

PhD, Research Institute of Plant Genetic Resources

[rustamov.nazar@bk.ru](mailto:rustamov.nazar@bk.ru)

**Khasanboy Nazarmetov**

Research Institute of Plant Genetic Resources

### ABSTRACT

Due to its composition, sage has various therapeutic and prophylactic properties, among which the most time-tested are antiseptic and anti-inflammatory. The antiseptic effect of sage is based on the components in its composition, which are called "plant antibiotics" - these are salvin and cineole, capable of restraining the proliferation of pathogenic bacteria and "disarming" them. The anti-inflammatory property of sage is due to the presence of flavonoids, tannins, which help strengthen cell membranes and vascular walls. In addition, sage has an astringent, fungistatic (stops the growth and reproduction of fungi), secretolytic effect (helps with dry cough), helps reduce sweating. Sage contains substances with estrogen-like properties, that is, close to female hormones.

**Key words:** sage, medicinal, property, characteristics, leaf, flower, seeds, planting depth, yield, harvest period

### АННОТАЦИЯ

Благодаря своему составу шалфей обладает различными лечебно-профилактическими свойствами, среди которых наиболее проверенными временем являются антисептическое и противовоспалительное. Антисептическое действие шалфея основано на компонентах в его составе, которые называют «растительными антибиотиками» — это сальвин и цинеол, способные сдерживать размножение болезнетворных бактерий и «обезоруживать» их. Противовоспалительное свойство шалфея обусловлено наличием флавоноидов, дубильных веществ, которые способствуют укреплению клеточных мембран и стенок сосудов. Кроме того, шалфей оказывает вяжущее, фунгистатическое (останавливает рост и размножение грибов), секретолитическое действие (помогает при сухом кашле), способствует уменьшению потоотделения. В состав

шалфея входят вещества с эстрогеноподобными свойствами, то есть близкие к женским гормонам.

**Ключевые слова:** шалфей, лекарственный, свойство, характеристики, лист, цветок, семена, глубина закладки, урожайность, период сбора урожая.

## INTRODUCTION

The homeland of sage is Italy and southeastern Europe (Greece, Albania, the republics of the former Yugoslavia). It has naturalized everywhere. It is not found in the wild in Russia; herbarium specimens are either cultivated or feral plants. It is cultivated in Greece, Italy, France, the Czech Republic, Slovakia, the republics of the former Yugoslavia, Moldova, Russia, Ukraine and other countries. It grows in fields, vegetable gardens, and orchards, both cultivated and feral. Sage is a heat-loving plant; it freezes in severe winters and with insufficient snow cover. It is drought-resistant and does not tolerate excess moisture.

Perennial plant 20-70 cm high. The root is woody, powerful, branched, densely fibrous at the bottom. The stem is straight, branched, heavily foliated, woody at the bottom, herbaceous at the top, tetrahedral, dying off in the upper part in winter, whitish-woolly from long wavy hairs. Leaves of vegetative shoots — stem oblong opposite, 3.5-8 cm long, 0.8-1.5 (up to 4) cm wide, blunt or acute, wedge-shaped or rounded at the base, finely serrated along the edge, wrinkled, lower and middle on long petioles, upper — sessile. Bracts — lanceolate, sessile, several times smaller than stem. Venation reticulate. Leaves densely pubescent, gray-green. Inflorescences are represented by a spike-shaped thyrus simple or branched, with six to seven spaced 10-flowered false whorls; calyx 9-10 mm long, almost halfway incised into two lips; corolla purple, twice as long as the calyx; the style protrudes slightly from the corolla; stigma with two unequal lobes. Fruit is a nut, 2.5 mm in diameter, almost round, dark brown, dry, with four lobes.

The raw material of medicinal sage is the leaf (lat. Folium Salviae) or flowering tops. The first collection is made in September in the year of sowing. In subsequent years, the leaves are collected 2-3 times during the growing season, starting with flowering and ending in September. Sage is harvested by mowing the above-ground mass.

The leaves are dried in dryers, attics, under a canopy. The yield of dry mass is (%): at the first summer harvest - 25, at the last autumn harvest - up to 35. Well-dried leaves are packed in bales and stored in a dry room. Sage is harvested for seeds when the seeds in the lower cups turn brown.

All parts of the plant contain essential oil, the amount of which in the leaves is 1.3-2.5%. The essential oil consists of D- $\alpha$ -

pinene, cineole (about 15%),  $\alpha$ - and  $\beta$ -thujone, D-borneol and D-camphor. The leaves also contain alkaloids, flavonoids, tannins, oleanolic and ursolic acids. The fruits contain 19-25% fatty oil, represented mainly by glycerides of linoleic acid. The yield of essential oil from the tops of stems with leaves and flowers for Crimea is indicated as 0.46%, for Sukhum - 0.32%; it has been established that the yield of oil increases before flowering.

Preparations from the above-ground part (leaves and flowers) of sage have a disinfectant, anti-inflammatory, astringent, hemostatic, emollient, diuretic effect, reduce sweating.

Sage is used in the form of a decoction or tincture - for rinsing the mouth as an astringent and antiseptic for stomatitis, bleeding gums, tonsillitis; in the form of douches - for gynecological diseases.

Inhalation of decoctions or aromatherapy essential oil is recommended for inflammation of the respiratory tract.

Sage is a drought-resistant plant. It is not demanding to the soil, it grows well on dry and loamy soils. Sage is propagated by seeds, seedlings, division of the bush and cuttings. The seeds are sown before winter in November-December, planting to a depth of 2 cm, the width between rows is left 60-70 cm. With the appearance of 4-5 permanent leaves, thinning is carried out, leaving plants at a distance of 40-50 cm. To obtain a high yield in the second and subsequent years, "rejuvenation" is carried out by cutting off last year's shoots in early spring. When sowing in spring, it is necessary to use sprouted seeds [7]. In the first year, the plant develops slowly, in subsequent years the number of shoots increases, they become woody in the lower part, to increase branching, "rejuvenating pruning" is carried out. Caring for sage comes down to regular weeding, loosening the space between rows and fertilizing.

Plantations of medicinal sage used for harvesting leaves give a good harvest for three to four years; under favorable conditions and proper agricultural technology, plantations can be used for up to 5-8 years.

Sage reproduces quite easily, using air layering and semi-woody cuttings. A lush branch fixed to the ground will put out new roots in a couple of months. A branch with roots can be transplanted to a new location by cutting it off from the mother plant. Sage easily crosses, so different types of sage must be planted separately from each other.

In Russia, the leaves of common sage are used as a medicinal raw material. Harvesting is carried out during the summer from cultivated plants. The leaves can be collected manually, 2-3 times during the growing season. During the first two harvests - the lower, most developed leaves, and in the fall - all and even the tops of the leaf-bearing stems. More

often, the collection is carried out mechanically. The grass is mowed with mowers, dried on threshing floors or in dryers, then threshed, the leaves are separated from the stems by sifting through sieves. When using artificial drying, the temperature should not exceed 35-40 °C, to prevent loss of essential oil.

The first collection of leaves from the plant is made in September in the year of sowing. In subsequent years, leaves for drying are prepared during the period of active growth, starting with the flowering period and ending in September, 2-3 times per season. Shoots with leaves and inflorescences are cut at a height of 15 cm from the ground and dried in dryers or under a canopy.

## CONCLUSION

Due to its composition, sage has various therapeutic and prophylactic properties, among which the most time-tested are antiseptic and anti-inflammatory. The antiseptic effect of sage is based on the components in its composition, which are called "plant antibiotics" - these are salvin and cineole, capable of restraining the proliferation of pathogenic bacteria and "disarming" them. The anti-inflammatory property of sage is due to the presence of flavonoids, tannins, which help strengthen cell membranes and vascular walls. In addition, sage has an astringent, fungistatic (stops the growth and reproduction of fungi), secretolytic effect (helps with dry cough), helps reduce sweating. Sage contains substances with estrogen-like properties, that is, close to female hormones.

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## FOSFOGIPSDAN FOYDALANISHDAGI KAMCHILIKLAR VA YUTUQLAR

X. A. Niyozov

Chirchiq davlat pedagogika universiteti, Chirchiq, O'zbekiston

[interpolymer.nxa@gmail.com](mailto:interpolymer.nxa@gmail.com)

## ANNOTATSIYA

So'nggi yillarda ko'plab tadqiqotchilar PG dan foydalanish bo'yicha keng qamrovli tadqiqotlar o'tkazdilar. Qurilish materiallariga oid tadqiqotlar doirasida PG bir nechta ilovalar uchun mavjud. Shunisi e'tiborga loyiqlik, PG dan sement ishlab chiqarishda tabiiy gipsga mumkin bo'lgan alternativa qobiliyatiga ega, lekin ko'pincha aralashmalarni (fosfatlar va ftoridlar) olib tashlashni talab qiladi, aks holda sementning mustahkamligi pasayishi mumkin. PG, shuningdek va qizil loy kabi keng tarqalgan sanoat chiqindilari bilan birlashtirilishi mumkin, bu ajoyib ishlashni namoyish qiluvchi kompozit materiallarni ishlab chiqarish uchun, xuddi shunday, tashqi muhitda ishlaganda sog'liq uchun xavfli bo'lmaganligi sababli, PG yo'l to'shagini to'ldirish uchun material sifatida ishlatilishi mumkin.

**Kalit so'zlar:** EVO10, skanerlovchi electron mikroskop, fosfogips, oltingugurt.

## ABSTRACT

In recent years, many researchers have conducted extensive research on the use of PG. Within construction materials research, PG is available for several applications. It is worth noting that PG has the ability to be a possible alternative to natural gypsum in the production of cement, but it often requires the removal of impurities (phosphates and fluorides), otherwise the strength of the cement may decrease. PG can also be combined with common industrial wastes such as red mud, which can be used as road bed fill material to produce composite materials that exhibit excellent performance, likewise, because it is not hazardous to health when working in an outdoor environment.

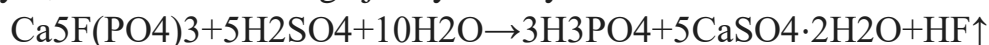
**Keywords:** EVO10, scanning electron microscope, phosphogypsum, sulfur.

## KIRISH

Fosfogips (PG) sanoat fosfor kislotasi ishlab chiqarishda qo'llaniladigan ho'l jarayondan olingan qattiq chiqindilar qoldig'ini tashkil qiladi. Uning asosiy komponenti  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$  bo'lib, fosfatlar, ftoridlar, sulfatlar, organik birikmalar, radioaktiv elementlar va og'ir metallar ionlari va boshqalarni o'z ichiga olgan aralashmalar to'plami bilan birga keladi. Digidrat usuli sifatida ham tan olingan fosfor kislotasini ishlab



chiqarishning nam usuli asosan tenglamada ko'rsatilgan reaksiya bilan tavsiflanadi.[1]. Fosfor kislotasini sintez qilishning ho'l usuli bilan bog'liq iqtisodiy samaradorlikka qaramay, PG ning katta zaryadsizlanishi hayratlanarli. Tegishli tadqiqotlarga asoslanib, dunyo miqyosida ishlab chiqarilgan har bir tonna fosfor kislotasi uchun taxminan 5 tonna PG hosil bo'ladi [2], [3]. Shu bilan birga, PG ning yillik global ishlab chiqarilishi taxminan 300 million tonnani tashkil etadi, shundan 20% Xitoy hissasiga to'g'ri keladi [6]. Fosforit resurslarining ko'pligi, yirik fosforli kimyo korxonalari va fosforli o'g'itlarning sezilarli darajada ishlab chiqarilishi tufayli Xitoyning Xubey provinsiyasi PG ning katta zaxirasini saqlaydi. 2020 yil oxirida Xitoyning Xubey provinsiyasidagi 37 ta omborda PG ning umumiy inventarizatsiyasi 296 million tonnadan oshdi [4]. Afsuski, katta miqdordagi PG ishlab chiqarish mutanosib foydalanish bilan aks ettirilmaydi, PG ning atigi 15% ni qayta ishlanadi, olgan 85% odatda tozalanmagan qattiq ikkilamchi xom ashyo sifatida poligonlarga yuboriladi. PG ning ko'p yillik to'planishi nafaqat yer resurslarini sezilarli darajada sarflaydi, balki atrof-muhitga jiddiy zarar yetkazadi.



So'nggi yillarda ko'plab tadqiqotchilar PG dan foydalanish bo'yicha keng qamrovli tadqiqotlar o'tkazdilar. Qurilish materiallariga oid tadqiqotlar doirasida PG bir nechta ilovalar uchun mavjud. Shunisi e'tiborga loyiqki, PG dan sement ishlab chiqarishda tabiiy gipsga mumkin bo'lgan alternativa qobiliyatiga ega, lekin ko'pincha aralashmalarni (fosfatlar va ftoridlar) olib tashlashni talab qiladi, aks holda sementning mustahkamligi pasayishi mumkin [5]. [6] PG, shuningdek va qizil loy kabi keng tarqalgan sanoat chiqindilari bilan birlashtirilishi mumkin, bu ajoyib ishlashni namoyish qiluvchi kompozit materiallarni ishlab chiqarish uchun, xuddi shunday, tashqi muhitda ishlaganda sog'liq uchun xavfli bo'lmaganligi sababli, PG yo'l to'shagini to'ldirish uchun material sifatida ishlatilishi mumkin. Bundan tashqari, PG tuproq stabilizatori sifatida foydalanish mumkin. PG tarkibidagi zararli aralashmalar uning muhandislik dasturlarini keskin cheklab qo'yganligi sababli, tadqiqotchilar uning mavjudligini ta'minlash uchun PG tarkibidagi aralashmalarni qanday yo'q qilishni keng o'rganishdi. Ushbu metodologiyalar skrining, yuqori haroratli kalsinatsiya, flotatsiya va yuvish, kimyoviy tozalash bilan ishlov berish va boshqalarni o'z ichiga oladi. PG ning fizik-kimyoviy xossalari tozalash jarayonlari orqali sezilarli darajada yaxshilanadi, uni kompleks ishlatish doirasi kengaytiriladi. Shunga qaramay, amaliy ishlab chiqarishda PG ni tozalash jarayonida murakkabliklar va yuqori xarajatlar kabi qiyinchiliklar mavjud. PGni to'g'ridan-to'g'ri qo'llashda past foydalanish darajasini hal qilish uchun hali ham harakatlar talab etiladi. Shu sababli, PG dan foydalanish darajasini sezilarli darajada oshirib, har qanday utilizatsiya qilish zaruratini bartaraf etadigan usulni o'rganish dolzarb muammo bo'lib qolmoqda.

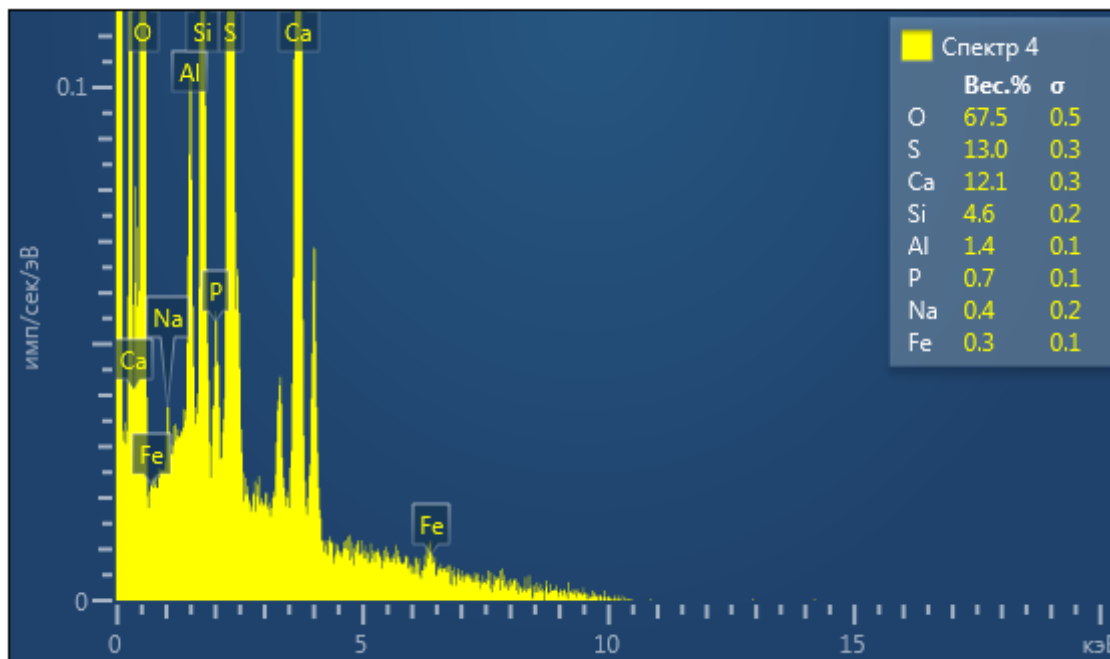
## ADABIYOTLAR TAHLILI VA METODOLOGIYA

Fosfogips namunasini elektron skanerlovchi mikraskopda tarkibidagi elementlarni joylashuvi.

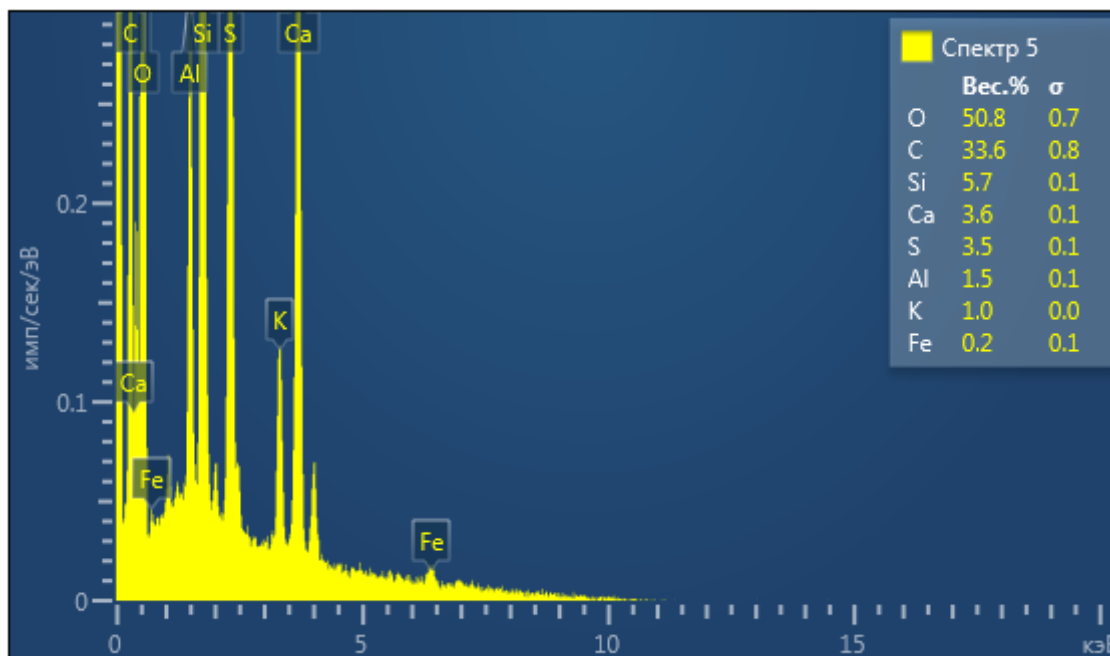
Ya'ni kyuvetaga solingan namunani bosh qismi 4-spektor va o'rta qismida 5-spektorda olingan elementlarni foizlarda ko'rinishi.

### NATIJALAR

1-Jadvalda 4-spektorda elementlarning joylasjuvi va farqi.



2-Jadvalda 5-spektordagi elementlarning joylashuvi va farqi.



### XULOSA

Jadvaldagi S oltingugurt elementi g'o'za o'simligida tola sifatini va mustahkamligi oshirishi adabiyotlarda bayon

etilgan. Fosfogipsda suv bilan erib o'simlikga kerakli bo'lgan mineral o'g'itlar N, P,  $P_2O_5$ , K, Mg va ko'plab moddalar sizib chiqadi. Buxoroda (KNAUF) fosfogipsdan hozirda gipsa karton ishlab chiqarishda katta ishlar olib borilmoqda. Fosfogipsdan qurilish sohasida qo'llashda tarkibidagi fosforli birikmalardan tozalash kerak bo'ladi. Qurilish materillariga fosforli birikmalr sifatiga zarar beradi, qishloq xo'jaligida esa mineral o'g'it sifatida foydalanish mumkin.

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## ATSETILEN ISHLAB CHIQUARISHDA HOSIL BO'LADIGAN QURUMNI QAYTA ISHLASH ORQALI TEXNIK UGLEROD OLISH USULI VA XOSSALARINI O'RGANISH

**Nosir Tojimurodovich Ortiqov**

Toshkent kimyo-texnologiya ilmiy tadqiqot instituti, PhD, katta ilmiy xodim

**Mas'ud Ubaydulla o'g'li Karimov**

Toshkent kimyo-texnologiya ilmiy tadqiqot instituti Ilmiy ishlar bo'yicha direktor o'rinbosari t.f.d., prof.

**Abdulaxat Turapovich Djalilov**

Toshkent kimyo-texnologiya ilmiy tadqiqot instituti  
Direktori k.f.d. prof. O'zRFA akademigi

### ANNOTATSIYA

Asetilen ishlab chiqarishda hosil bo'ladigan qurumni qayta ishlash orqali texnik uglerod olishda dastlam olingan chiqindi mahsulotni eritma xolatida mexanik unsurlardan tozalanadi. Tozalangan eritma tarkibidagi Fe, Ca, Si, Al metal ionlaridan konsentirlangan kislota yordamida 60-80 °C harorat oralig'ida 4-soat davomida jarayon olib boriladi. So'ngra metallar eritmaga o'tadi, eritma o'tgan tuzlar sentrifugada netrallanib 120°C haroratda quritilib yangi Gost talablariga muvofiq kul miqdori 0.7%, yodni yutish miqdori 89 g/kg, Yog'ni yutish darajasi(m<sup>3</sup>/kg) bo'lgan texnik uglerod olindi.

**Kalit so'zlar:** Asetilen, Yodni yutish miqdori (g/kg), Kul miqdori %, Cho'zilishni og'irlik kuchi, Qora emulsiya, Texnik uglerod.

### KIRISH

Texnik uglerod (сажа) - ugleroddan tashkil topgan mahsulot bo'lib, u kauchuk ishlab chiqarishda mustahkamlovchi sifatida keng qo'llaniladi, bosma siyoh va bo'yoqlar ishlab chiqarishda, sifatli qora pigment sifatida, shuningdek, plastmassa va kabelda mustahkamlovchi, ularga maxsus xususiyatlarni berish uchun ishlatiladi. Texnik uglerod boshqa sohalarda ham oz miqdorda qo'llaniladi. Ishlab chiqarilgan texnik uglerodning taxminan 70% shinalar sanoati tomonidan iste'mol qilinadi, taxminan 20% boshqa rezina buyumlar ishlab chiqarishga ketadi va 10% boshqa kauchuk bo'lmagan (plastmassalar, laklar, bo'yoqlar, elektrografik kompozitsiyalar va boshqalar) ishlatiladi.

## ADABIYOTLAR TAHLILI VA METODOLOGIYA

2010 yildan boshlab texnik uglerodning jahonda ishlab chiqarish doimiy ravishda o'sib bormoqda agar 2009 yilda texnik uglerod ishlab chiqarish taxminan 10 million tonnani tashkil etgan bo'lsa, 2017 yilda bu 14,5 million tonnaga yetdi. Keyingi yillarda global texnik uglerod ishlab chiqarishning yillik o'sish sur'atlari yiliga 5-5,6 % oralig'ida bo'lishi kutilmoqda. Qora pigment rangga bo'lgan bunday katta ehtiyoj, birinchi navbatda, uning noyob mustahkamlovchi xususiyatlari bilan izohlanadi. 1.1-jadval. har xil turdagi kauchuklardan texnik uglerod bilan to'ldirmasdan olingan va texnik uglerod bilan to'ldirilgan vulkanizatlarning xususiyatlarini ko'rsatadi /1/. Taqdim etilgan ma'lumotlardan texnik uglerod bilan to'ldirish kauchukning kuchlanish kuchiga qanday ta'sir qilishini ko'rish mumkin.

### 1-jadval

#### Eng muhim elastomerlar asosida olingan kauchuklarning mustahkamligi

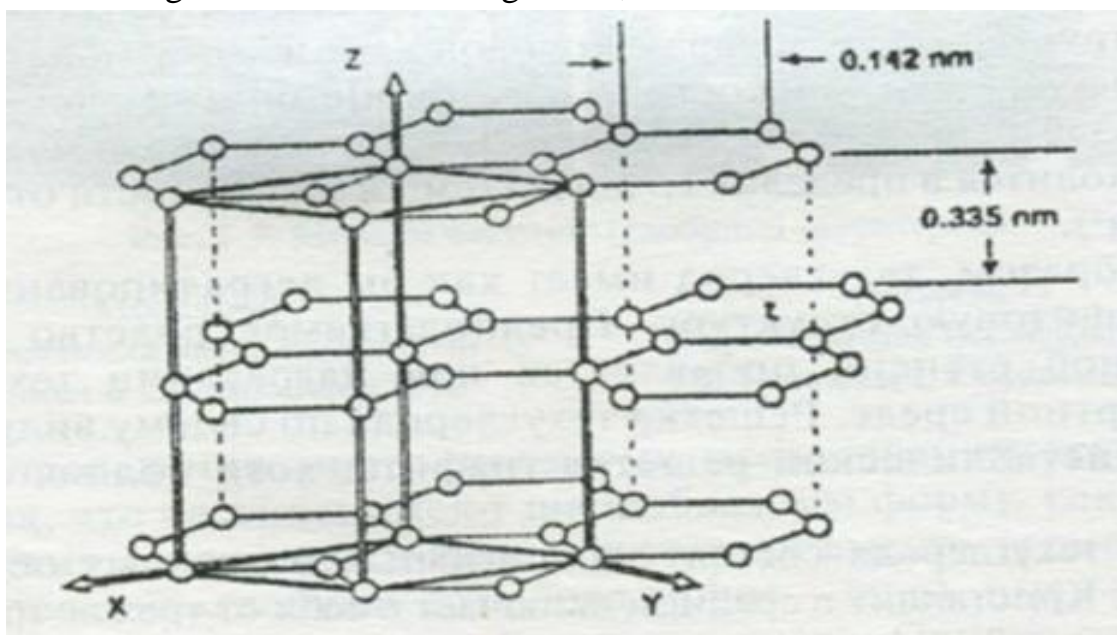
Elastomer	Uzilishdagi mustahkamlik MPa	
	To'ldirilmagan vulkanizat	Texnik uglerod bilan to'ldirilgan vulkanizat
Butadien stirol kauchuk	3,5	24,6
Butadien nitril kauchuk	4,9	28,1
Etilen propilen kauchuk	3,5	21,1
Poliakrilat kauchuk	2,1	17,6
Polibutadien kauchuk	5,6	21,1

Vulkanizatsiyadan oldin ham texnik uglerod kauchuk bilan bog'lanadi va bu aralashmani erituvchilar yordamida texnik uglerod va kauchukga to'liq ajratib bo'lmaydi. To'ldiruvchining kiritilishi hisobiga materialning fizik xususiyatlarini yaxshilash mustahkamlovchi (mustahkamlash) deb ataladi va bunday plomba kuchaytirgichlar (texnik uglerod, kremniy oksidi) deb ataladi. Kauchuk aralashmalarda kerakli rang berish yoki aralashmaning narxini pasaytirish uchun ishlatiladigan boshqa dispers kukunlar - bo'r, kaolin, talk, temir oksidi va boshqalar mustahkamlovchi xususiyatlarga ega emas.

Kauchuk aralashmalarda ishlatiladigan ko'p miqdordagi ingredientlardan texnik uglerod og'irlikda kauchukdan keyin ikkinchi o'rinda turadi. Texnik uglerodning sifat ko'rsatkichlarining kauchuk mahsulotlarining xususiyatlariga ta'siri asosiy tarkibiy qism - kauchukning sifat ko'rsatkichlariga qaraganda ancha katta. Kauchuklarni texnik uglerod bilan to'ldirilishi tufayli kuchaytiruvchi ta'sir kauchuk sanoatini rivojlantirish uchun kauchukni oltingugurt bilan vulkanizatsiya qilish hodisasiday muhim ahamiyat kasb etadi. Texnik uglerod- bu eng yangi muhandislik texnologiyalari va boshqaruv usullarini o'z



ichiga olgan jarayonning mahsulidir. Barcha sanoat uglerod mahsulotlari ichida texnik uglerod tarkibida eng ko'p miqdorda uglerod mavjud (99% dan ortiq). Tabiatda sof uglerod faqat olmos va grafit shaklida uchraydi. Rentgen nurlari diffraktsiyasidan foydalanib, grafit va texnik uglerod tuzilishidagi o'xshashlik aniqlangan. 1-rasmda ko'rsatilganidek, grafitdagi uglerod atomlari atomlararo masofasi 0,142 nm (nanometr =  $10^{-9}$  m) bo'lgan kondensatsiyalangan aromatik halqa shaklidagi tizimlarning katta qatlamlarini hosil qiladi, buni benzoldagi uglerod atomlari orasidagi masofalar solishtirilganda 0,139 nm tashkil etadi.



Aromatik tizimlarga kondensirlangan ushbu grafitli qatlamlar bazis tekisliklar deb atalishi qabul qilingan. Grafit qatlamlari orasidagi masofa 0,335 nm.

### NATIJARLAR VA MUHOKAMA:

Asetilen ishlab chiqarishda hosil bo'ladigan qurumni qayta ishlash orqali texnik uglerod olishda dastlam olingan chiqindi mahsulotni eritma xolatida mexanik unsurlardan tozalanadi. Tozalangan eritma tarkibidagi Fe, Ca, Si, Al metal ionlaridan konsentirlangan kislota yordamida 60-80 °C harorat oralig'ida 4-soat davomida jarayon olib boriladi. So'ngra metallar eritmaga o'tadi, eritma o'tgan tuzlar sentrifugada netrallanib 120°C haroratda quritiladi. Qurtilgan mahsulot dezintegratorida 0.10  $\mu$ m maydalanadi. Ushbu usulda olingan texnik uglerodni kul miqdorini ASTM D1506-15 va GOST 25699.8-90 ma'lumotlari orqali o'rganildi.

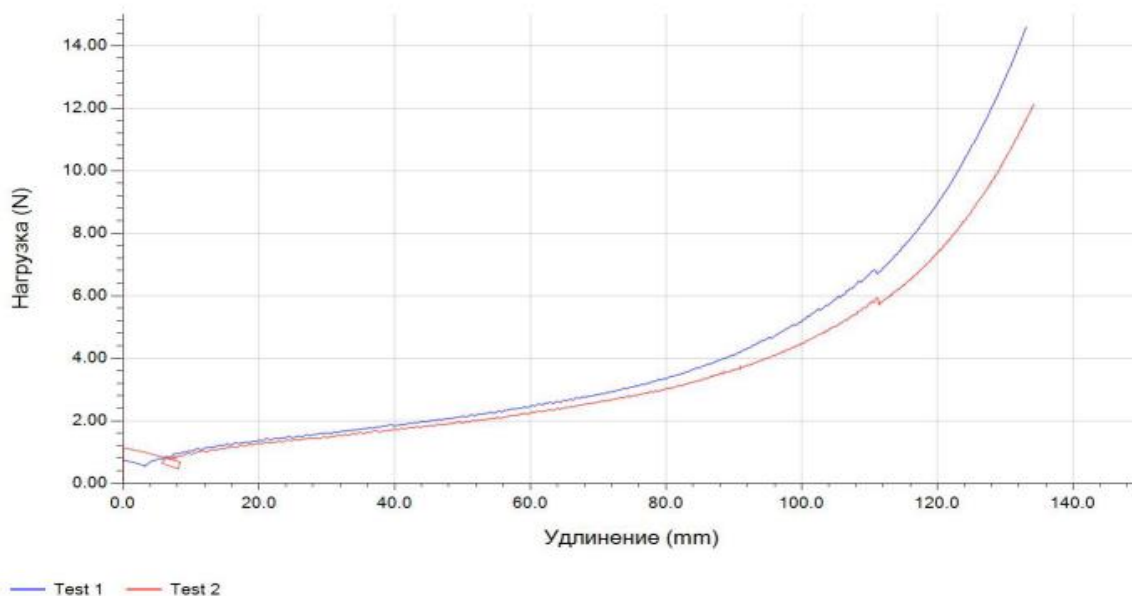
O'tkazilgan tadqiqotlarimiz davomida olingan TU-90 markali texnik uglerodni unumiga harorat, vaqt va kislota konsentratsiyasining ta'siri o'rganildi. Olingan texnik uglerodning yodni yutish miqdori, yog'ni yutish darajasi, Issiqlik yo'qotishi miqdorlari fizik- kimyoviy usullar bilan o'rganildi va quyidagi 1 – jadval keltirilgan:

1-jadval

## Olingan namunalarning BRZ MCHJ XK da o'tkazilgan fizik -kimyoviy sinov natijalari

№	Sinov namunalari va usuli	N220	N234	N326	N330	N375	N660	Факт	Синоу усули
1.	Yodni yutish miqdori (g/kg)	121±7	120±7	82±6	82±6	90±6	36±5	89	ASTM D1510
2.	Yog'ni yutish darajasi(m <sup>3</sup> /kg)	114±6	125±7	72±6	102±6	114±6	90±5	120.1	ASTM D2414
3.	Issiqlikda yo'qotilish 125°C (%)≤,	3.0	3.0	3.0	3.0	3.0	3.0	1.17	ASTM D1509
4.	Kul miqdori (%)≤,	0.7	0.7	0.7	0.7	0.7	0.7	0.7	ASTM D1506

Olingan tahlil natijalaridan ko'rish mumkin olingan TU-90 markali texnik uglerod N 220, N 234, N 326, N 330, N 375, N 660 markali texnik uglerodlar bilan taqqoslab ko'rilganda fizik-kimyoviy sinov natijalari N 375 markali texnik uglerodning sifat ko'rsatkichlariga muvofiq ekanligi aniqlandi. Olingan TU-90 markali texnik uglerod asosida emulsiya tayyorlanib tibbiyot va xo'jalik pechatkalari uchun qora rang berishda qo'llanilib namunalar olindi.



1-rasm. Cho'zilishni og'irlik kuchiga ta'siri

2-jadval

## Perchatkaga qo'shilgan qora emulsiya mustahkamlik ko'rsatkichlari

Tekshirilayotgan namunalar	Og'irlik kuchi ta'sirida uzilish(N)	Kuchlanishda uzilish (MPa)	Uzilishdagi nisbiy deformatsiya %	Kengligi (mm)	Qalinligi (mm)
1	14.592	25.072	532.587	6.000	0.097

2	12.129	21.279	537.474	6.000	0.095
Eng kam miqdorda	12.129	21.279	532.587	6.000	0.095
O'rtacha miqdorda	13.360	23.176	535.030	6.000	0.096
Ko'p miqdorda	14.592	25.072	537.474	6.000	0.097

Olingan natijalar GOST ma'lumotlari asosida sinovdan o'tkazildi. Harorat 25°C, namligi 45%, namuna tayyorlash turi 1 GOST 270, tezlik sinovi 500.000mm.min oldindan kuchlanish 0.100 N, o'lchov bazasi 25.000mm, namuna uzunligi 115.000mm.

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